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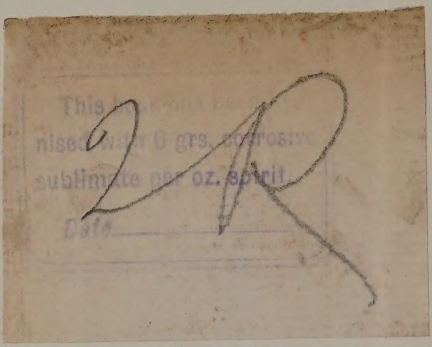

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TO

MEDICAL DIAGNOSIS.

By the same Author.

The Morbid States of the Stomach and Duodenum, and their Relations to the Diseases of other Organs. With 10 Lithographic Plates, 8vo, cloth, 12s.

THE STUDENT'S GUIDE

TO

MEDICAL DIAGNOSIS.

BY

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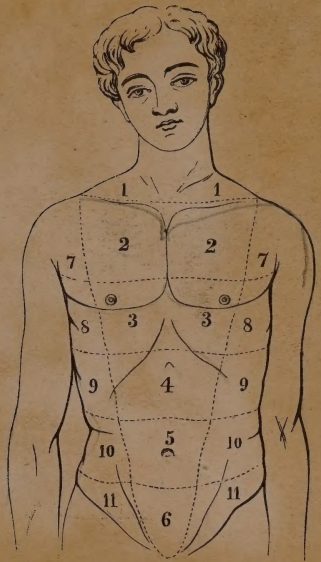
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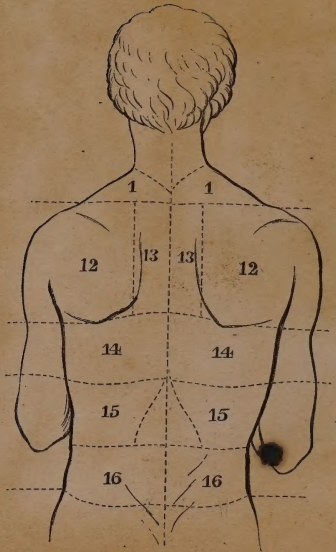
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12
13
13
12
14
14
15
15
16
16

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PREFACE.

THE following pages were originally designed to assist the students attending the medical out-patient department of the London Hospital. The plan of instruction generally pursued there is to give to each pupil a succession of cases of a similar character. In this way, whilst one is practising the laryngoscope, another is studying auscultation, a third affections of the nervous system, and so on. After examining a case, the student is expected to state his diagnosis, and the treatment he would adopt. Although this method of *individual* instruction is doubtless more beneficial than the practice of teaching in classes, yet it necessarily involves a constant repetition on the part of the teacher. To obviate the loss of time thus incurred, I commenced to write out some general rules for diagnosis, which the student might keep beside him as a guide in his examinations. It was afterwards suggested to me to elaborate the idea, and hence the appearance of the present volume.

As the pupils have been supposed, not as yet, to have acquired any professional knowledge, except in anatomy and physiology, all technical words have been avoided as far as practicable, and the explanations have been given in the plainest language. Drawings and diagrams have been employed whenever the nature of the subject permitted their use.

It will be observed that I have confined myself to the general rules of diagnosis, and taken but little notice of the exceptions to them that are met with in practice. This has arisen, partly from a desire to keep the volume

within a moderate compass, but mainly because exceptional, or as they are generally termed, "interesting cases," form the usual texts for clinical lectures, and are therefore less required by the student in an elementary work.

A number of subjects of interest have been omitted, such as the varieties of phthisis, &c. This has not arisen from any doubts as to the importance of these questions, but because it was not considered advisable to discuss, in a work of this kind, views which are not as yet generally admitted by clinical teachers.

In order to secure greater accuracy in the description of medical cases, various writers have recommended students to use outlines of the human body, so that they may mark upon them the parts at which the signs of disease are observed. For this purpose figures 9 and 10 have been printed on a separate sheet, which is enclosed along with a piece of "carbon paper" in the cover of the book.*

I have to thank my colleagues, Dr. Hughlings Jackson and Dr. Morell Mackenzie, for many valuable suggestions in the chapters treating of the diseases of the brain and larynx, and Dr. Woodman, for much kind help; to Dr. Marston, Royal Artillery, I am especially indebted for the advice and assistance he has afforded me throughout the preparation of the work.

HARLEY STREET, CAVENDISH SQUARE,
October 1*st*, 1869.

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* Directions for using the outline figures:—Let the black surface of the "carbon paper" be placed upon the page of the note-book, and the figure laid above it; then draw firmly any blunt-pointed instrument over the lines of the figure, and, on removing the "carbon paper," the outlines of the body will be found on the page. When the "carbon paper" is worn out it can be replaced at a trifling cost.

CONTENTS.

CHAPTER I.

PAGE

The value of diagnosis in medicine 1
Necessity of case-taking . . . . . .
Plan for the taking of cases . . . . . .

CHAPTER II.

DISEASES OF THE HEART AND PERICARDIUM.

Morbid Anatomy:

Pericarditis 7
Hydropericardium 7
Hypertrophy of the heart 7
Dilatation of the heart 8
Fatty degeneration 8
Endocarditis 8
Tubercle and cancer 9

Different Methods of Physical Diagnosis:

Estimation of the size of the heart 9
Sounds of the heart 9
Different kinds of stethoscopes 10
Indications afforded by the pulse 10

Acute Diseases of the Heart:

Pericarditis with effusion of fluid 12
,, with effusion of lymph 13
Endocarditis 13
Nervous palpitation 14

Chronic Diseases of the Heart:

Those in which the area of dulness is increased:

Hypertrophy 14

PAGE

Dilatation 15
Hydropericardium 15

Those in which the area of dulness is not necessarily increased:

Diseases of the valves 15
Fatty degeneration 19
Angina pectoris 19

ANEURISM OF THE AORTA:

Diagnosis 20
The use of the sphygmograph 22

CHAPTER III.

DISEASES OF THE LUNGS.

MORBID ANATOMY:

Pleurisy 25
Hydrothorax 25
Pneumothorax 26
Bronchitis 26
Emphysema 26
Congestion of the lungs 26
Pulmonary apoplexy 27
Pneumonia 27
Tubercle in the lung 28
Cancer of the lung 29

DIFFERENT METHODS OF PHYSICAL DIAGNOSIS:

Percussion 30
Auscultation 31
Spirometer 50
To find lung-tissue in the expectoration . . . 51

ACUTE DISEASES OF THE LUNGS:

Those with dulness on percussion:

Pneumonia 37
Pleurisy with effusion of fluid 39

Those without dulness on percussion:

Pleurisy without effusion of fluid 41
Bronchitis 41
Hooping-cough 42
Acute phthisis 42

Having a tympanitic sound on percussion:

Pneumothorax 43

PAGE

CHRONIC DISEASES OF THE LUNGS:

Those with dulness on percussion:

Chronic pleurisy 44
Hydrothorax 44
Consolidation of the lung by tubercle 45
Tubercle in the stage of softening 47
Tubercular cavity in the lung 47

Those without dulness on percussion:

Chronic bronchitis 48
Dilated bronchi 49

Having abnormally clear sound on percussion:

Emphysema 49

THE ATTACKS ARE ONLY OCCASIONAL:

Asthma 50

CHAPTER IV.

DISEASES OF THE THROAT AND LARYNX.

MORBID ANATOMY:

Tonsillitis 55
Diphtheria 55
Œdema of the larynx 55
Croup 56
Ulcerations of the larynx 56
Stricture of the œsophagus 56

METHOD OF PHYSICAL EXAMINATION:

Examination of the throat 56
Use of the laryngoscope 58

DISEASES OF THE THROAT AND ŒSOPHAGUS:

Inflammation of the throat 56
Tonsillitis 57
Diphtheria 57
Stricture of the œsophagus 58

DISEASES OF THE LARYNX:

Croup 61
False croup 61
Ulceration of the larynx 61
Œdema of the glottis 61
Aphonia 62

CHAPTER V.

DISEASES OF THE KIDNEYS.

PAGE

MORBID ANATOMY:

Congestion of the kidney 63
Suppurative nephritis 63
Acute tubular nephritis. 63
Chronic tubular nephritis 64
Fatty kidney 64
Amyloid degeneration of the kidney 64
Intertubular nephritis 65
Dilatation of the kidney 65
Tubercular disease of the kidney. 65
Cancer of the kidney 65

METHODS OF PHYSICAL EXAMINATION:

Examination of urine 66, 67, 77
To ascertain the size of the kidneys. . . 71, 129

THE URINE IS ALBUMINOUS:

The urine is albuminous and contains tube casts:

Acute tubular nephritis. 69
Chronic tubular nephritis 71
Fatty kidney 71
Amyloid kidney 71
Intertubular nephritis 71

The urine is albuminous, has no tube casts, but deposits pus:

Dilatation of the kidney 73
Tubercle of the kidney 73

The urine is albuminous, has no tube casts, but contains blood.

The passage of a calculus down the ureter . . 74
Stone in the kidney 75
Cancer of the kidney 75
Intermittent hæmaturia 76

THE URINE CONTAINS SUGAR:

Diabetes 77

THE URINE IS NOT ALBUMINOUS, BUT PRESENTS A DEPOSIT:

The deposit is crystalline:

Lithic acid 78

PAGE
Oxalate of lime 79
Triple phosphate of lime 80
Cystine 80
The deposit is amorphous:
Pus 81
Urate of soda or ammonia 81
Earthy phosphates 81

CHAPTER VI.

DISEASES OF THE LIVER.

MORBID ANATOMY:
Congestion of the liver 82
Acute hepatitis 82
Acute yellow atrophy 83
Cirrhosis 83
Hydatid cysts 83
Fatty liver 84
Amyloid liver 84
Cancer of the liver 84
Diseases of the gall ducts 84

METHODS OF PHYSICAL DIAGNOSIS:
Percussion 85
Palpation 85
Testing for bile-pigment in urine 86
Tyrosine and leucine in urine 89

ACUTE DISEASES OF THE LIVER:
Acute congestion of the liver 87
Abscess of the liver 87
Jaundice from obstructed ducts 88
Acute yellow atrophy of the liver 89

CHRONIC DISEASES OF THE LIVER:
The organ is increased in size:
Fatty liver 90
Amyloid liver 91
Hydatid tumour of the liver 91
Congestion of the liver 92
Cancer of the liver 92
The organ is diminished in size:
Cirrhosis 93

CHAPTER VII.

DISEASES OF THE STOMACH.

PAGE

MORBID ANATOMY:

Post-mortem solution 95
Congestion of the stomach 95
Sub-acute gastritis 96
Chronic gastritis 96
Ulceration of the stomach 97
Amyloid degeneration 97
Dilatation of the stomach 98
Cancer of the stomach 98

METHOD OF PHYSICAL DIAGNOSIS:

Inspection of the tongue 99
Palpation 100
Percussion 100
Examination of vomited matters 101

ACUTE DISORDERS OF THE STOMACH:

Bilious attack 103
Sub-acute gastritis 104

CHRONIC DISEASES OF THE STOMACH:

Atonic dyspepsia 104
Neuralgia of the stomach 105
Chronic gastritis 105
Ulceration of the stomach 106
Cancer of the stomach 106

THE ORGAN IS INCREASED IN SIZE:

Dilatation of the stomach 107

CHAPTER VIII.

DISEASES OF THE PERITONEUM AND INTESTINES.

MORBID ANATOMY:

Peritonitis 109
Enteritis 110
Intus-susception of intestine 111
Cæcitis 111
Perityphlitis 111
Stricture of the intestine 111
Tubercular affections 112

ACUTE DISEASES: PAGE

The disease is attended with severe pain:

Acute peritonitis 113
Enteritis 114
Colic 115
Intestinal obstructions 116
Dysentery 116

The disease is not attended with much pain:

Asiatic cholera 117
Diarrhœa 118

CHRONIC DISEASES:

The disease is attended with severe pain:

Chronic peritonitis 118
Cancer of the peritoneum 118
Cæcitis 119

The disease is not attended with severe pain:

Constipation 120
Chronic diarrhœa 120

CHAPTER IX.

ABDOMINAL TUMOURS.

THERE IS A GENERAL AND UNIFORM ENLARGEMENT OF THE ABDOMEN:

Flatulence 122
Ascites 122
Malignant disease 123

THE TUMOUR IS CONFINED TO ONE PART:

Directions for examination 124
Tumours of right hypochondrium 125
,, epigastrium 125
,, left hypochrondrium 126
The diseases of the spleen 127
Tumours of umbilical region 128
,, lumbar region 129
,, iliac region 130
,, hypogastric region 130

CHAPTER X.

DISEASES OF THE BRAIN.

PAGE

MORBID ANATOMY:

Meningitis 131
Acute hydrocephalus 131
Chronic hydrocephalus 132
Congestion of the brain 132
Encephalitis 132
Abscess of the brain 132
Hæmorrhage into the brain 133
Tubercle of the brain 133
Cancer of the brain 133
Spinal meningitis 133
Myelitis 133
Locomotor ataxia 133
Wasting palsy 133

METHODS OF PHYSICAL DIAGNOSIS:

Use of the ophthalmoscope 134

THERE IS AN ALTERATION IN THE MENTAL CONDITION:

There is suspension of the mental faculties:

Apoplexy 136
Sunstroke 138
Catalepsy 138
Acute hydrocephalus 139
Epilepsy 139

The patient suffers from delirium:

Acute meningitis 141
Delirium tremens 142

The patient suffers from gradual diminution of his mental powers:

Chronic softening of the brain 143
Chronic meningitis 143

THE PROMINENT SYMPTOMS ARE THOSE OF ALTERATION IN THE POWERS OF MOTION:

There is diminution or loss of muscular power:

Hemiplegia 144
Paralysis of the insane 146
Locomotor ataxia 147

PAGE

Paraplegia 147
Wasting palsy 148

There is increased and involuntary muscular action:

Tetanus 149
Hydrophobia 149
Chorea 149
Paralysis agitans 150
Mercurial tremor 150

THE HEAD IS MUCH INCREASED IN SIZE:

Chronic hydrocephalus 150
Hypertrophy of the brain 150

THERE IS SEVERE PAIN OF THE HEAD WITHOUT FEVER: THE INTELLECT AND POWER OF MOTION BEING UNAFFECTED:

The causes of headache 151

CHAPTER XI.

FEVERS.

PHYSICAL MEANS OF DIAGNOSIS:

Thermometer 152
Estimation of urea 153

THERE IS A WELL-MARKED ERUPTION WHICH HAS APPEARED WITHIN THE FIRST FOUR DAYS OF THE ILLNESS:

Measles 154
Scarlatina 155
Rubeola 156
Erysipelas 156
Small-pox 157
Chicken-pox 158

NO ERUPTION IN THE EARLY STAGE: IF PRESENT IT IS USUALLY SMALL IN AMOUNT: THE FEBRILE SYMPTOMS ARE CONTINUOUS:

Typhus 159
Enteric or typhoid 160
Relapsing fever 162
Influenza 163

THE ATTACKS OF FEVER ARE PERIODICAL:

Ague 164

CHAPTER XII.

RHEUMATISM AND GOUT.

PAGE

Acute rheumatism 165
Sub-acute rheumatism 165
Chronic rheumatism 166
Gout 166
Rheumatic gout 167

GUIDE

TO

MEDICAL DIAGNOSIS.

CHAPTER I.

INTRODUCTION.

It is evident that before any one can successfully treat a disease he must be acquainted with its nature and the symptoms it produces. For instance, before prescribing for a patient suffering from pain in the head, you must ascertain from what the pain arises. It may result from the irritation of a decayed tooth, the extraction of which will give relief; or from inflammation of the periosteum, in which case you prescribe iodide of potassium with success; or from constipation of the bowels, for which a purgative only is required; or again, it may be symptomatic of an incurable disease of the brain, which might be aggravated by many of the remedies well fitted for the cure of a less formidable disorder. Diagnosis is the science which teaches us thus to distinguish one disease from another, and to trace symptoms to the causes from which they spring.

Now, diagnosis is not only valuable for treatment, but it enables you to form an accurate opinion as to the future course of a disease. For example, two persons complain of palpitation of the heart: in the one you may be able to diagnose that the organ is healthy in its structure, but excited by disordered

digestion; in the other you may find it affected with an incurable disease that may at any moment terminate the patient's life.

Before commencing to study the means of diagnosing the diseases of an organ, you should acquaint yourself with its healthy structure and with the morbid conditions to which it is liable. You will not be able to understand why the chest gives a clear sound when struck with the fingers in a patient suffering from bronchitis, and a dull sound in a case of pneumonia, unless you know that the resonance of a healthy chest depends on the air contained in the cells of the lung, and that these cells are unaffected in bronchitis, but are filled with fluid or solid matters in pneumonia. Refresh your memory, therefore, as to the anatomy and physiology of each organ, and carefully read over the description of the different diseases to which it is liable, before you begin to learn how to diagnose them. You should also take every opportunity of comparing the remarks on morbid anatomy with the appearances presented to you at the post-mortem examinations, so as to make yourself familiar with the structural changes produced by disease.

Diseases are distinguished from each other either by such alterations in the organs themselves, or their secretions, as can be determined by the senses of the observer (physical signs); or by the changes in the functions of the parts affected (symptoms).

The physical signs of a disease are least liable to mislead us, inasmuch as in their employment we are independent of any misconception or exaggeration on the part of the patient. Thus, when we hear an abnormal sound in the region of the heart, or find the lung dull on percussion, or discover blood in the urine, we know there must be some abnormal condition of the heart, lung, or urinary organs. Great attention has been given of late years to this part of diagnosis, and various instruments have been invented—such as the stethoscope, laryngoscope, &c.—for the purpose of

enabling us more accurately to appreciate the nature and extent of morbid changes. Care and patience are, however, required before you will be able to use these instruments efficaciously; and I have therefore placed at the commencement of each chapter an account of the different methods of physical examination required, and a few directions as to the best mode of conducting them.

Physical signs cannot be exclusively relied upon for the formation of a diagnosis: the symptoms and history of the case must be also taken into consideration. It is generally difficult for the young student to guide the patient's account in such a way as to derive the necessary information from the details. Most persons ramble in describing their symptoms, and many insist on giving their own or other persons' opinions as to the nature of their disease, instead of confining themselves to the narration of facts. You will best overcome these difficulties by conducting your examination in a systematic manner, and by having a definite aim in every question you ask.

Students generally expect that some one sign or symptom is sufficient to indicate each disease, but, unfortunately, this is not the fact—we can generally only diagnose any morbid condition by a combination of symptoms; indeed, we are sometimes forced to determine the nature of a malady by proving what it is not, rather than what it is. The plan of diagnosis adopted in the following pages has been to divide all the diseases of each organ into groups, by fixing upon some well-marked character which is possessed by some in common, but is wanting in others; and in the same way to divide and subdivide each group. Thus, the diseases of the liver are first grouped into acute and chronic affections; the latter are again divided, according as the organ is enlarged or diminished in size; and the enlargements are further subdivided into those in which there is, and into those in which there is not, either pain or tenderness on pressure.

The art of diagnosis would be readily acquired if the symptoms of each disease were in all cases the same; but this is not so. Although therefore the rules laid down will generally suffice, yet you will occasionally meet with cases in which the accustomed signs are absent, or in which unusual symptoms are present. For instance, no complaint has more strongly marked signs than peritonitis — the excessive and general pain of the abdomen, the great tenderness on pressure, the rapid, wiry pulse—and yet you may meet with fatal peritonitis with scarcely any pain, or without tenderness, or with a pulse not above the normal standard.

In order to obtain the necessary skill in diagnosis, it will be requisite that you should practise the "taking of cases." You should record the symptoms and physical signs present in each case, the order in which the symptoms have been developed, the treatment adopted, the progress of the disease, and, if it terminate fatally, you should add the morbid appearances discovered after death. You will readily understand that unless some plan is adopted, there is great probability that you will either encumber your description of the disease with a number of unnecessary details, or overlook important facts. I have therefore added the following suggestions for a plan, which you may perhaps find useful until experience enables you to propose a better.

Commence with the name and address of your patient, his age, and occupation.—The age is important, because many diseases, such as cancer, are chiefly found at certain periods of life. The nature of the occupation often gives a clue to the complaint; as, for instance, painters and other workers in lead are especially liable to colic and paralysis.

Note the position of the patient.—In pleurisy with effusion he usually rests on the affected side; he is propped up in bed in many diseases of the heart and lungs; he lies flat and helpless in fever, &c.

The condition of the body.—Emaciated as in phthisis, œdematous in diseases of the heart and kidney, &c.

The state of the skin.—Yellow, as in jaundice, dry and harsh as in some diseases of the kidney, soft and perspiring in rheumatic fever, &c.

The features and expression.—Every feature may furnish important indications of disease. The arcus senilis often accompanies disease of the heart and arteries; the nostril is dilated in dyspnœa; the cheek hangs, and the angle of the mouth drops in palsy, or it is drawn down into a rigid smile in tetanus, &c.

Whilst noting the above or any other peculiarity, avoid all unnecessary staring at your patient; educate your eye to catch the smallest deviation from the normal condition, and at the same time try to put the patient at his ease, so that he may be the more ready and willing to answer your inquiries.

Next inquire as to the manner in which the complaint commenced, whether suddenly or gradually; if it followed some other disease, such as scarlatina or rheumatic fever, &c.; or if it could be reasonably attributed to any particular cause, as "cold," accidents, &c. Ascertain also if any of his family has been subject to any particular malady, and if he has generally enjoyed good health before his present illness.

The best way of commencing your inquiries as to the organ more especially affected, is to ask where the patient suffers pain. If, for example, he complains of the right side of the chest, you know the lung is situated in that part, and you inquire into the state of the functions of that organ, and ask if he suffers from cough, expectoration, dyspnœa, hæmoptysis, &c. Having determined which organ is diseased, ascertain the nature of the ailment by the rules laid down in the chapter referring to it, and note the symptoms and physical signs present in the case.

It is seldom that any organ remains long diseased without implicating others. You must therefore inquire into the manner in which the functions of all the

chief organs are performed; paying more especial attention to those which are most liable to suffer with that primarily or chiefly affected. Thus, if you should suspect a disease of the liver to be an "amyloid degeneration," you would particularly examine the state of the spleen and kidneys; or in a case of contracted kidney you would record the condition of the heart and retinæ.

In every case it is important that you should note the state of the pulse, respiration, tongue, and appetite, together with the condition of the bowels, and the amount and characters of the urine, and, if any fever exists, the temperature in the axilla.

Remember to commit all your observations to writing. A number of well-recorded cases is invaluable, and forms the best "practice of physic" for your future reference and guidance. Describe only what you see and hear, do it in the simplest language, and do not allow your expressions to be guided by any preconceived opinion as to the nature of the disease you are investigating. Be exact in your description of physical signs, and, as much as possible, employ your pencil in marking out on diagrams of the body the precise spots at which you discover signs of abnormal conditions. In this way, with ordinary industry in collecting cases of disease and perfect honesty in recording your observations, you cannot fail to surmount the difficulties of medical diagnosis.

CHAPTER II.

DISEASES OF THE HEART AND PERICARDIUM.

1. The chief diseases of the heart are pericarditis, hydropericardium, hypertrophy, dilatation, fatty degeneration, endocarditis, and diseases of the valves.

2. Pericarditis or inflammation of the pericardium.—When death occurs in the early stage the lining membrane is found of a red colour, it is rough, pulpy, thickened and covered with a layer of lymph. At a later period the pericardium is distended with a turbid fluid, having flakes of lymph floating in it; in other cases the fluid is stained with blood, or mixed with pus. The first effects of pericarditis are to excite the action of the heart and to set up general fever; if the fluid effused be large in amount it lessens the power of the heart, and thus produces congestion of the lungs and other important organs. After the cessation of the inflammation we often find bands between the opposed surfaces of the pericardium, or its cavity is closed by general adhesions.

3. Hydropericardium or dropsy of the pericardium.—Fluid of an amber colour distends the cavity of the pericardium, without the lining membrane being thickened or inflamed. It chiefly arises from diseased heart or kidneys. The compression of the fluid prevents the free action of the heart and thus gives rise to congestion of the lungs and of the muscular structure of the heart.

4. Hypertrophy of the Heart.—The heart is of a globular shape, and is greatly increased in size; often double or treble the normal weight. The thickness of its walls is also much increased. Microscopically,

unless fatty degeneration is present, the fibres are sharp, and their transverse striæ well defined. The left ventricle is most frequently affected. Hypertrophy is often associated with contracted kidney, or it may result from adherent pericardium, disease of the valves, or any other obstruction to the free current of blood. The increased strength of the heart's action, when it is hypertrophied, tends to produce disease of the brain and other important organs.

5. Dilatation of the Heart.—The shape of the heart is more square than when healthy; the organ is much increased in size, but the thickness of its walls is lessened. Dilatation is most common in the right ventricle. In consequence of the feeble contraction of the organ the lungs and liver are apt to be congested and dropsy is produced. Dilatation and hypertrophy are very often conjoined—that is to say, the cavities of the heart are dilated whilst the thickness of its walls is increased.

6. Fatty Degeneration.—The heart is of a pale yellow colour, and it feels soft, flabby, and greasy. Microscopically, the fibres have lost their sharp edges and striæ, and are more or less loaded with oil. The left ventricle and the carneæ columnæ are most liable to fatty degeneration. This condition is chiefly found in persons of old or middle age, and is generally associated with other affections of the heart, diseases of the arteries or other structures. Its chief effect is to greatly diminish the energy of the heart's contraction, so that the brain and other organs are imperfectly supplied with blood, and attacks of pseudo-apoplexy are induced.

7. Endocarditis, or inflammation of the endocardium.—In this disease the lining membrane of the heart is roughened with lymph, or the valves become opaque, or contracted, and are thus unable to perform their functions. The first effects of the inflammation are excitement of the heart's action and fever; in other instances portions of lymph or clots are swept into the general circulation and form plugs ("emboli") in the arteries of

the brain, spleen, kidneys, &c., producing disease of these organs. In old persons the valves of the heart often become thickened, atrophied, contracted, or ossified. By whatever means the proper action of a valve is prevented the result is the same—viz., obstruction to the flow of blood, or a backward current of blood takes place through the opening (regurgitation), and dilatation or hypertrophy is set up in the cavities of the heart.

8. TUBERCLE and CANCER of the heart are rare.

9. Make yourself acquainted with the size and sounds of the healthy heart. Always examine the patient in a recumbent position if it is possible to do so.

10. You estimate the size of a heart by percussion. To do this, tap lightly on the back of the forefinger of the left hand laid over the heart's region with the pulp of the forefinger of the right hand. Commence where the sound is dullest, and gradually proceed outwards until the clear sound shows you that you have reached the edge of the lung. Mark the boundaries with ink. You will find that the right boundary of the dulness over a healthy heart is a vertical line through the middle of the sternum extending downwards from the level of the fourth costal cartilage. The left boundary extends in a waving line from the sternum, opposite the fourth costal cartilage, to the apex of the heart. The inferior boundary is on a line extending from the lower edge of the sternum along the sixth costal cartilage to the apex of the heart. Remark that the apex of the healthy heart beats between the fifth and sixth left ribs, or, in the male, one or two inches below, and to the right of the left nipple. In women the breast must be drawn aside whilst percussing.

11. There are two sounds of the heart. To hear the first place your stethoscope over the apex; for the second listen at the middle of the sternum, just above the third costal cartilage. (The third costal cartilage is the most prominent one in the upper part of the chest.) The first sound is duller and longer than the second,

and coincides with the impulse of the heart and the pulse in the arteries.

12. A word of advice as to the choice of a stethoscope may be here useful. The wooden stethoscope is best fitted for the ordinary examination of the heart. Before buying one see that the ear-piece is sufficiently large and accurately fits your *own* ear, and that the opposite end is of moderate size. The flexible stethoscope of Dr. Cammann, in which an ear-piece fits into each ear, can be used for the examination of the heart, but it is better fitted for auscultation of the lungs. The double or differential stethoscope of Dr. Scott Alison is exceedingly useful in many diseases of the lungs, and may be also employed with advantage in the diagnosis of valvular diseases. If, for instance, you wish to ascertain whether a murmur you hear originates in the mitral or the aortic valves, place one cup over the apex of the heart, and the other on the sternum just above the third costal cartilage. If the murmur originates in the mitral, the sound will be only heard through the cup placed on the apex of the heart, but if it arises in the aortic valves it will be only audible through the other tube.

13. The state of the pulse affords the best indication of the manner in which the heart is performing its office. Never feel the pulse when you begin to speak to the patient, but wait until he has overcome any nervousness your visit may have excited. The application of a single finger to the artery is sufficient to enable you to count the rapidity of the pulse, but it is better to apply two or three fingers when you wish to estimate its other conditions.

14. In feeling the pulse you must take notice of its frequency, regularity, strength of pulsation, and its resistance to pressure. The pulse is most frequent in infancy (110—120 in the minute); in adults it is usually about 72. It is generally very slow in compression of the brain; quick in fevers, inflammation, and when there is great debility. The pulse is said to

intermit when a beat ceases to be felt every few pulsations. It is irregular when the beats occur at irregular intervals, as in certain disorders of the heart. The strength and fulness of the pulse are of great importance, as they indicate the force with which the circulation is carried on; the pulse is strong in young persons and in hypertrophy of the heart; feeble in dilatation of that organ, and in those weakened by disease. The compressibility of the pulse must always be considered; if the pulse ceases to be felt on a slight pressure of the finger you may be sure that the circulation is in a feeble state. In old persons you may suppose that a feeble pulse is a strong one from the coats of the artery being thickened; to ascertain if this is the case, compress the vessel, and then move your finger along it, when you will readily detect any hardness of the coats that may be present.

15. You may suspect disease of the heart if the patient complain of pain in that region, if there is either palpitation, blueness of the lips and face, difficulty of breathing, cough, and expectoration, dropsy of the limbs, or if he has an irregular or intermitting pulse. Ascertain if his symptoms have commenced suddenly (acute disease), and if so, begin at (16); but if gradually (chronic disease), pass on to (27).

SECTION I.

Acute Diseases of the Heart.

16. The acute diseases include pericarditis (first and second stage), endocarditis, and nervous palpitation. It will simplify your diagnosis to begin by percussion, for if the cardiac space is much enlarged you have to deal with pericarditis accompanied by effusion; if not, any of the others may be present.

17. *a.* You find the dulness over the heart's space increased and of a pyramidal shape, the apex being above; the heart's sounds are diminished, the impulse

lessened, sometimes undulatory. The apex often beats above its normal position.

The disease is *pericarditis with effusion of fluid.*

18. The sounds are diminished on account of being transmitted through fluid, the apex is raised by the pressure of the fluid. You are most likely to mistake

FIG. 1.

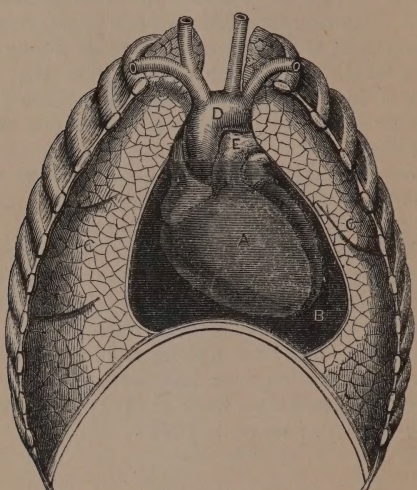


Illustration of the position of the heart in pericarditis, and of the distension of the pericardium with fluid. The heart's sounds are indistinct, excepting above the effusion; the impulse is feeble. The extent and shape of the percussion dulness may be judged of by the appearance of the distended sac. A. The heart. B. The fluid in the pericardium. C. The lungs. D. The aorta. E. The pulmonary artery. (DA COSTA.)

hydropericardium for this stage of the disease. Pericarditis is usually attended with pain and tenderness on pressure, whilst the former is not, and pericarditis is almost always accompanied by acute rheumatism or

kidney disease, but dropsy of the pericardium seldom occurs except as a sequel to hydrothorax.

19. *b.* The dulness over the heart's space is not much, if at all, increased in size, the sounds are normal, but are attended with a double, superficial, creaking sound; the impulse of the heart is generally increased.

The disease is *pericarditis with effusion of lymph.*

20. Pericarditis is generally attended with pain over the heart, increased by pressure. There is great anxiety, difficulty of breathing, fever; the pulse is quick, often irregular or intermittent. Delirium frequently occurs.

21. The "creaking" or "rubbing" sound is produced by the surfaces of the pericardium roughened with lymph rubbing against each other. You may mistake this condition for endocarditis. You must therefore note that in pericarditis the sound attends both the systole and diastole, that it is superficial, and is confined to the region of the heart; that by pressure with the hand or stethoscope you may often alter or intensify the character of the sound, and that pericarditis is generally attended with pain and tenderness.

22. *c.* One or both sounds of the heart are accompanied or are replaced by a lengthened blowing sound (a murmur).

The disease is *endocarditis.*

23. The murmur is the result of the thickening, roughening, or imperfection of one of the valves.

24. Endocarditis is accompanied by anxiety, increased impulse of the heart, rapid and often irregular pulse, cough, and fever. Like pericarditis, it is generally developed in the course of rheumatic fever or diseased kidneys. The chief difficulty is to ascertain whether a murmur arises from recent endocarditis, or is produced by old valvular disease. The diagnosis is determined by the presence of fever in endocarditis, and also by the enlargement of the heart that generally follows long-standing alterations in the valves. In both endocarditis and pericarditis increased action of

the heart often precedes the development of the stethoscopic signs.

25. *d.* The heart's sounds are too loud and clear, impulse increased, the apex beats in its natural place, and the pulse is not permanently irregular.

The disease is *nervous palpitation.*

26. Nervous palpitation arises from sympathy with some other derangement. The beating of the heart is generally more distressing than when organic disease is present. The most common causes of the complaint are indigestion, gout, disordered menstruation, excessive use of tobacco, tea, or alcoholic stimulants.

SECTION II.

Chronic Diseases of the Heart.

27. The chronic diseases of the heart are hypertrophy, dilatation, hydropericardium, disease of the valves, and fatty heart. First mark out by percussion the size of the organ: the first three are always attended by an enlarged area of dulness, the other two are not necessarily, although often so, on account of their frequent association with the former.

A. *You find the area of dulness increased.*

28. *a.* The first sound of the heart is dull, muffled, prolonged; the second rather lower pitched than natural; the impulse increased and heaving; the apex beats at a lower space than in the normal condition.

The disease is *hypertrophy of the heart.*

29. The pulse is generally firm and strong. The increased impulse arises from the greater strength of the organ, and the sounds are deadened because transmitted through so large a mass. This disease is often associated with diseased kidney, or it may result from adherent pericardium, or valvular affection.

30. Hypertrophy of the heart is generally accompanied by cough, expectoration, and dyspnœa; but the symptoms vary greatly according to the condition of

the heart or other organs with which the hypertrophy is associated.

31. *b.* The first sound of the heart is clear, short, and sharp, resembling the normal second sound, the impulse feeble, and sometimes undulatory; the apex beats at a lower point than natural.

The disease is *dilatation of the heart.*

32. The pulse is small, feeble, or irregular and intermitting. The most prominent symptoms are palpitation, dyspnœa, cough, and expectoration, blueness of face and lips, dropsy, disordered digestion, and scanty urine. The feeble impulse and loud sounds arise from opposite causes to those of hypertrophy.

33. The student will generally find hypertrophy and dilatation conjoined, and the signs vary according to which of these conditions is in excess. The most common causes of dilated heart are disease of the valves and emphysema of the lungs. When the hypertrophy is greater than the dilatation, the dulness of the heart's space is chiefly increased from above downwards; but when the dilatation is in excess, the dulness is greater transversely.

34. *c.* The heart's sounds are feeble and distant; impulse lessened, sometimes undulatory; the apex of the heart, if its impulse can be felt, beats in its usual position; the shape of the dulness on percussion is pyramidal, the apex of the pyramid above.

The *disease is hydropericardium.*

35. This seldom occurs except as an accompaniment of hydrothorax and general dropsy. For its diagnosis from pericarditis with effusion, see (18).

B. *The area of dulness is not necessarily increased.*

36. *a.* One or both sounds of the heart is replaced, or accompanied by a blowing sound (a "murmur").

There is disease of *one of the valves of the heart.*

37. When you detect a murmur over the heart's region, you have *first* to find whether it arises from the lungs or heart. Ask the patient to stop his breathing for a few seconds. If the murmur be produced in the

lungs, it will of course immediately cease along with the respiration.

38. To ascertain which valve is affected, place the stethoscope on the apex. If the murmur is loudest at the apex (A, fig. 2), and inaudible or only faintly

FIG. 2.

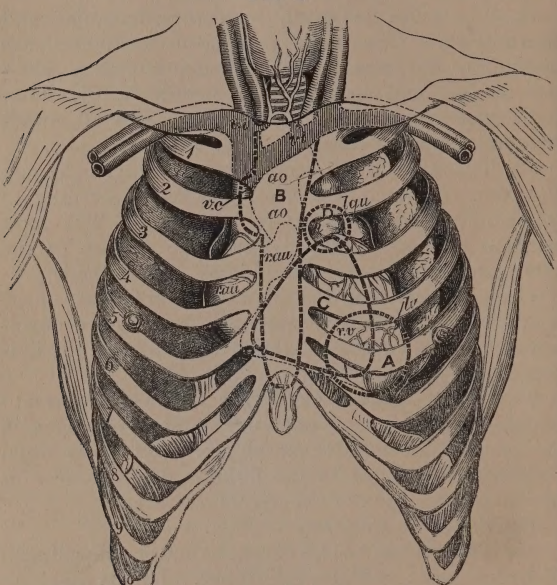


Diagram showing the areas over which the murmurs produced in the different valves of the heart are chiefly audible. A. The seat of the mitral murmur. C. The seat of tricuspid. B. Seat of the aortic. D. Seat of pulmonary murmur. *r. v.* Right ventricle. *l. v.* Left ventricle. *l. au.* Left auricle. *r. au.* Right auricle. *ao.* Aorta. *v. c.* Vena cava. (GAIRDNER.)

audible at the ensiform cartilage, and if it can be heard at the inferior angle of the left scapula, the *mitral valve* is diseased, or incompetent to perform its

functions. If its intensity is greatest at the ensiform cartilage (see *c*, fig. 2), and it is only faintly heard or inaudible at the apex, there is regurgitation through the *tricuspid valve*. If it is loudest at the middle of the sternum, just above the third costal cartilage, it depends on an affection either of the aortic or pulmonary valves (see B and D, fig. 2); if loudest above the second right costal cartilage, the *aorta or its valves*, if above the second left costal cartilage, the *pulmonary artery or its valves* is the seat of the murmur.

39. Next, whilst listening through the stethoscope, keep your finger on the pulse, and find whether the murmur corresponds with the pulse and first sound of the heart (systolic), or whether it occurs with the second sound (diastolic).

A mitral systolic sound arises from the blood being forced by the ventricle through the patent valve into the auricle (regurgitant murmur).

A mitral diastolic, or "pre-systolic," *sound*, from the blood passing through an open mitral valve from the auricle into the ventricle (direct murmur).

A tricuspid systolic sound from the blood passing from the right ventricle into the right auricle (regurgitant murmur).

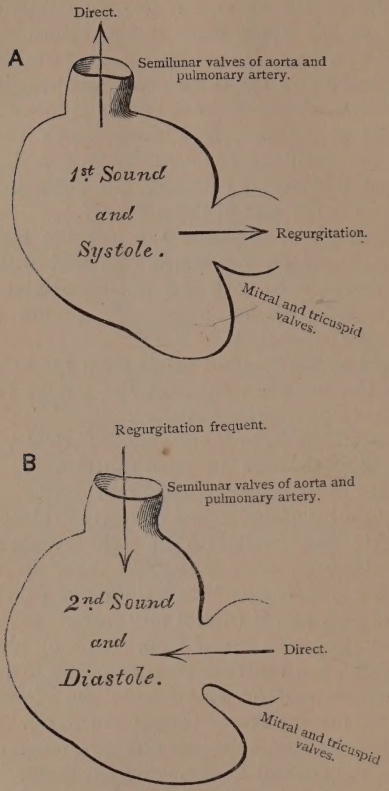
An aortic systolic sound from the blood passing along the aorta or its valves (direct murmur).

An aortic diastolic sound from reflux of blood from the aorta into the ventricle (regurgitant murmur).

A pulmonic systolic sound from the blood passing into the pulmonary artery (direct murmur). The *tricuspid diastolic*, and *pulmonic diastolic*, murmurs are so rare, that the student need not regard them.

40. When the mitral valve is diseased the pulse in the earlier stages may be small and regular; in the later stages it is irregular or intermitting. With regurgitation through the aortic valves the superficial arteries can be seen pulsating and the pulse is "jerking." When the tricuspid valve is affected the external jugular veins are swelled and pulsating. A "purring tremor" can

FIGS. 3 and 4.



Showing the murmurs that may arise in the systole and diastole of the heart. (After HOPE.) The arrows point the directions which are taken by the currents of blood; thus it is seen in A, that with the systole you may have a direct murmur in the aortic or pulmonary artery, or a regurgitant murmur in the mitral or tricuspid valves, whilst, as in B, these may be observed to be reversed in the diastole of the heart.

be often felt by the hand applied to the chest in cases of diseased mitral valve or diseased aorta.

41. The systolic sounds audible above the third costal cartilage do not necessarily arise from disease of the vessels or valves; they may be produced by alterations in the blood. If the patient is young and anæmic, and has no general symptoms of heart disease, the murmur is probably from deficiency of blood; but if the heart is enlarged or other valves are diseased, or the patient has suffered severely from acute rheumatism, or is at or past middle life, the sound probably arises from disease of the vessel or its valves. It is rare to find disease of any of the valves of the heart, except when the affection is recent, unaccompanied by dilatation or hypertrophy.

42. The general symptoms of diseased aortic valves are often slight. When present, they are dyspnœa, cramping pain of chest and arms on exertion, giddiness, cough, and sometimes dropsy. Mitral and tricuspid disease produce the symptoms of dilated heart (32).

43. *b.* The sounds of the heart are feeble, impulse very weak. When along with these physical signs and without other apparent cause the patient is exceedingly feeble, subject to severe attacks of dyspnœa and *faintings*, and has either a very feeble and quick, or a very slow pulse, you may suspect *Fatty Degeneration of the Heart.*

44. I have put *suspect:* for the positive diagnosis of fatty heart is very difficult, and in many cases, with our present means of diagnosis, impossible. It is generally believed that a white ring round the cornea (arcus senilis) when coexisting with other signs, renders the existence of fatty heart probable. Rupture of a fatty heart sometimes occurs. Generally death takes place instantaneously; in other cases sudden severe pain is experienced in the region of the heart, and the patient suffers from intense dyspnœa until his death.

45. *Angina Pectoris*, or spasm of the heart, is a severe cramping pain of the chest and arms, coming on

suddenly, and usually during exertion. It is apt to occur in several diseases of the heart, such as affections of the valves and fatty degeneration.

SECTION III.

Aneurism of the Aorta.

46. You will frequently find on slitting up the aorta that there is a white patchy appearance produced by the presence of a soft substance below its lining membrane ("atheroma"). In other cases there is a hard, earthy deposit ("ossification").

47. The aorta when diseased is apt to become dilated in some part of its course; but this most frequently takes place in the ascending portion. When its calibre is uniformly enlarged it is said to be "dilated," but if its coats give way or become distended at one point so as to form a sac, it is termed an "aneurism." An aneurism when once formed usually continues to increase in size, and the blood admitted into it deposits layers of fibrine.

48. The first effect of an aneurism is to cause pressure upon some of the structures by which it is surrounded. If situated in the ascending aorta it may force itself outwards and cause absorption of the ribs and sternum, forming a tumour visible on the surface of the chest. In other cases it compresses the trachea, bronchi, or œsophagus, obstructs some of the large arteries, distends the veins of the head, neck, and chest, or paralyses the recurrent nerve or sympathetic. Ultimately it may cause death by bursting, or the patient may sink from exhaustion.

49. The diagnosis of aortic aneurism is often very difficult, and not unfrequently you have to surmise its presence from the absence of other morbid conditions capable of giving rise to the symptoms of the patient.

50. When the aneurism has proceeded so far as to form a tumour on the chest its detection is easy.

You find a pulsating tumour, dull on percussion, often accompanied by a systolic murmur, and most generally situated on the right side of the sternum. In other cases, although no distinct tumour is present, you may discover a part of the chest over the aorta dull on percussion, and you may hear a systolic murmur at this part.

51. When the arch is affected you may be unable to detect either dulness or murmur, and then your judgment must be guided by the signs of pressure on some of the parts near the aorta. Thus, dyspnœa is one of the most common symptoms; it often occurs in paroxysms, and may be relieved or aggravated in certain positions. It may be accompanied by slight spittings of blood which recur from time to time. Sometimes you find a difference in the loudness of the respiratory murmur, either in one lung as compared with the other, or in one lobe of either lung. Difficulty of swallowing often occurs, but in many cases it varies greatly in amount; at one time of the day the patient may be able to take solids, when at another even liquids can be scarcely taken into the stomach. Cough is very general and may come on in severe paroxysms. Not unfrequently the voice alters, and becomes harsh and shrill from the pressure on the recurrent nerve, but you will find great variations in tone at different times. An inequality between the pulses in the carotid, subclavian, or radial arteries of each side is a very valuable sign, the most certain indications of which are given by the sphygmograph. The veins of one side of the chest or neck may be seen to be swollen, and this frequently gives the first hint of the true nature of the case. An inequality between the pupils has been sometimes remarked.

52. In dilatation of the aorta you have not the signs of pressure you encounter in sacculated aneurism, but you may sometimes detect the presence of this condition by an increased pulsation and a thrilling above the notch of the sternum. In other cases you may suspect it from a loud, almost metallic second sound of the heart

in a person whose radial arteries seem to be thickened and diseased.

53. The sphygmograph often affords valuable information in cases of aortic or subclavian aneurism, and as it is also of use in the diagnosis of diseases of the heart, you should practise yourself in its employment.

54. The instrument consists of a flexible steel spring, having at its end a small plate of ivory for the purpose of resting on the radial or other artery. The movement communicated to the spring by the pulse is transmitted to a light lever which registers the motions of the artery upon a piece of paper or smoked glass travelling at a uniform rate by means of clockwork.*

55. The chief difficulty in the use of the sphygmograph is the exact application of the spring to the pulse, and Dr. Sanderson gives the following directions to facilitate this: "The artery can be best explored just as it passes over the ligament which extends across the most projecting part of the styloid process of the ulna; for above it is surrounded by a quantity of fatty cellular tissue, and lies on the surface of the *pronator quadratus* muscle, whereas beyond, in the interval between the ligament and the scaphoid prominence, it sinks below the tendon of the *flexor longus pollicis*. In order that the centre of the convex ivory plate which shields the end of the spring may press on the artery at the point indicated, the best rule to follow is to make the edge of the block next the spring coincident with a line drawn across the wrist from the radial spine, while its inner edge rests upon the tendon of the *flexor longus pollicis*, and on the prominence of the scaphoid."

56. In fig. 5, No. 1, you see a tracing of the normal pulse, and you will remark that there is a succession of curves, each one of which presents an ascending line, a summit, and a descending line.

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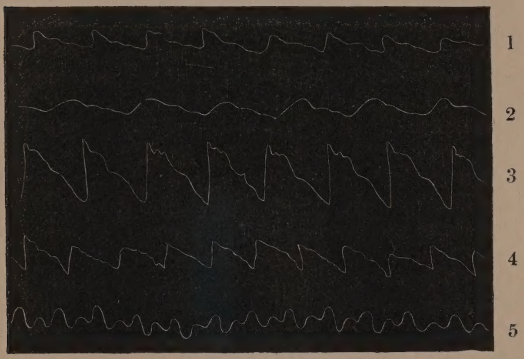
* Mr. Meyer, of Great Portland-street, has lately constructed a sphygmograph which is more portable and much more easy to use than that of Marey.

57. As the ascending line is produced by the left ventricle throwing its contents into the arteries, it is evident that the more quickly the heart overcomes the forces opposed to it—viz., the elasticity of the vessels and the tension of their contents—the more vertical will be that line. Thus, in No. 3, fig. 5, the line is vertical; the case was one of aortic regurgitation, and the heart was able to throw its blood rapidly into the vessels, emptied by the escape of their contents into the ventricle; but it is oblique in No. 2, fig. 5, where an obstruction at the entrance of the aorta caused a dif-

FIG. 5.



Sphygmographic tracings in different diseases.
(SANDERSON and FOSTER.)

ficulty in the distension of the arteries. At No. 4, fig. 5, a tracing is given of the irregularity of the pulse caused by disease of the mitral valve.

58. In the normal pulse the line of descent is more oblique than that of ascent, because the tension of the arteries gradually subsides in proportion as the elasticity of the vessel enables it to empty itself through the capillary system. In aortic regurgitation the fall is sudden; in cases where the arteries are thickened it is usually very oblique.

59. In certain cases strongly marked undulations occur in the line of descent (dicrotism). The best marked examples are to be found in typhus (No. 5, fig. 5). In aneurism of the descending thoracic aorta the dicrotism is often much increased in both pulses, particularly in the right.

CHAPTER III.

DISEASES OF THE LUNGS.

60. The principal morbid changes affecting the pleura are, pleurisy, hydrothorax, pneumothorax, tubercular and cancerous deposits; those of the lungs are, bronchitis, dilatation of the bronchi, emphysema, congestion, pulmonary apoplexy, pneumonia, tubercular and cancerous deposits.

61. Pleurisy, or inflammation of the pleura.—In the first or dry stage the surface of the membrane is red, roughened, and covered with a layer of lymph or semi-gelatinous matter. This stage may terminate by recovery or by adhesion of the opposite sides of the pleura; but, generally, a turbid fluid is also effused, mixed with flakes of coagulated lymph; or the cavity of the chest may become distended with pus (*empyema*). The first effect of pleurisy is to set up fever; afterwards, if the amount of fluid be large, the lung is compressed against the spine, and the walls of the chest are pushed outwards; if the effusion be on the right side, the diaphragm and liver are displaced downwards; if on the left, the heart may be felt and heard to beat on the right side of the chest. If the fluid is absorbed and the lung is incapable of expansion, the whole of the affected side contracts, and the spine presents a lateral curvature. One of the most common causes of pleurisy is tubercular disease of the lung.

62. Hydrothorax, or water in the chest.—This is a form of dropsy in which a straw-coloured fluid is effused into the cavity of the pleura. The pressure of the fluid produces congestion of the lungs by preventing their free expansion.

63. Pneumothorax, or air in the pleura.—This arises from a communication taking place between the bronchial tubes or air-cells of the lung and the cavity of the pleura; in other rare cases the air gains an entrance from other organs. The immediate effect of the admission of air into the pleural cavity is to cause collapse of the lung and consequent danger of suffocation. If the patient survives, inflammation is set up, lymph is effused, and fluid or pus collects in the pleural sac.

64. Bronchitis, or inflammation of the bronchial tubes.—In the acute stage the mucous membrane of the tubes is red, rough, soft, thickened, and covered with mucus or a muco-purulent fluid; sometimes ulceration takes place. In chronic cases the muscular structure is increased, and the tubes are thickened and dilated. When the smaller tubes are inflamed the disease is termed "capillary bronchitis," and the danger to life is proportional to the minuteness of the tubes affected. Acute bronchitis often causes collapse of the air-cells in children and old persons. Chronic bronchitis gives rise to dilatation of the bronchial tubes, either into cavities or into irregularly expanded tubes (see fig. 15).

65. Emphysema. — The lungs are very much increased in volume, and lose their elasticity; they do not collapse when the chest is opened; the air cells are greatly dilated, and often appear like little bladders below the pleura. The increased size of the lungs presses the ribs outwards so that the chest becomes barrel-shaped; it also pushes the heart and diaphragm downwards, and the heart may be seen and felt beating in the epigastrium. The loss of elasticity calls into play the expiratory muscles, which become enlarged, and the obstruction to the circulation through the lungs produces dilatation of the heart. The free edges of the lungs are chiefly affected by emphysema, consequently they overlap the heart and occupy the upper part of the hepatic region.

66. Congestion of the Lungs.—This is one of the

most common morbid appearances found after death. The lung is loaded with blood, is of a dark colour and heavy, but it crepitates under the finger and floats in water; when the part is washed the cellular structure is seen to be unaffected. Any circumstance that prevents a free circulation through the pulmonary system will produce congestion. Œdema, or dropsy of the lung, results from long continued congestion.

67. Pulmonary Apoplexy.—The lung is of a dark colour, loaded with blood, and heavy. On making a section of it, numerous round, sharply-defined, black patches of extravasated blood are found, chiefly in the lower lobes. These are softer and more friable than the neighbouring parts, do not crepitate on pressure, and sink in water. Microscopically, the air-cells in the dark patches are found to be filled with coagulated blood. Pulmonary apoplexy almost always results from disease of the heart, and notably from disease of the mitral valve.

68. Pneumonia, or inflammation of the lung.—This disease is described as having three stages. First, *engorgement;* second, *red hepatization;* third, *grey hepatization.* In *engorgement* the appearances are those of an intense degree of congestion. In *red hepatization* the lung is somewhat enlarged; it is red coloured, solid like liver, friable, heavy, sinks in water, and appears granular when cut or torn. Microscopically the air-cells are seen to be filled with blood and granulation-cells, and the smaller bronchial tubes are usually choked with plugs of lymph. In *grey hepatization* the tissues are of a dirty-grey colour, solid, easily broken down by the finger, and sink in water. Microscopically, all parts of the structure are loaded with pus-cells, granular matter, exudation-cells, and cylindrical epithelium. Pneumonia may terminate by resolution, or it may go on to abscess or gangrene. In abscess the inflamed part breaks down into an irregularly-shaped cavity, filled with pus and the *débris* of lung-structures. In gangrene a portion of the diseased

part becomes of a dark colour, is very friable, and has a very fœtid odour. Pneumonia is often associated with pleurisy; it almost always begins at the lowest lobes, and spreads upwards, and is usually confined to one lung.

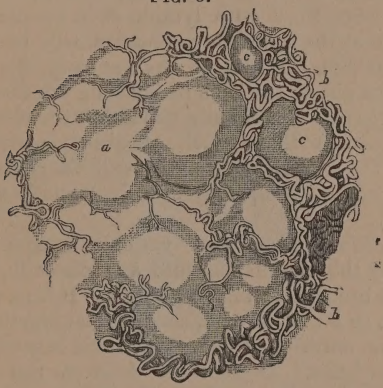
69. Tubercle in the Lung constitutes the disease named phthisis pulmonalis (consumption). Tubercle presents itself in three stages—*consolidation* or *deposition*, *softening*, *ulceration*. In the stage of *deposition* the tubercle may be scattered through the lungs in the form of small, round, hard, grey, semi-transparent granules (miliary tubercles); or it may be present in the shape of hard, opaque, yellow, cheesy masses (crude yellow tubercle). Sometimes the tubercle dries up into a chalky mass (obsolete tubercle). Generally it softens, inflammation is set up in the surrounding structures, which become soft, friable, and loaded with blood: this is the second stage, or that of *softening*. *Ulceration* succeeds, and one or more ragged, irregularly-shaped cavities are produced, forming the third stage. The cavities may either increase in size, and be found after death filled with pus and broken up tubercle and lung-structures, or an attempt at cure may occur, the inflammation of the surrounding structures subsides, and the cavity becomes lined with a smooth membrane. Microscopically, tubercular matter consists of small oval or angular cells, generally devoid of nuclei, intermixed with granules and fatty matters. In the first stage it is effused into and distends the air-cells and smaller bronchi (see fig. 6); during softening and ulceration, portions of tubercle and lung-structures are expelled by coughing.

70. Tubercle in the lungs generally gives rise to pleurisy, so that the opposed surfaces of the membrane are united by adhesions. It is almost always associated with similar deposits in other organs; in the adult, ulcerations of the intestines and larynx are apt to take place; in children, the bronchial glands, the brain, and peritoneum are the parts generally affected. Tubercle

attacks the summits of the lungs first, just as pneumonia generally commences at the lower lobes. Consumption is an hereditary complaint, so that the family history should be carefully investigated whenever the presence of tubercles in the lungs is suspected.

71. Cancer of the Lungs, although a comparatively rare disease, may occur under different forms. *Scirrhus* of the lung forms a hard, firm, white, well-defined tumour, from which a juice can be squeezed, which under the microscope is seen to contain fibres along

Fig. 6.



Tubercular deposit in the lung, as seen under the microscope. (Rainey.) *a*. Tubercle which has broken down the walls of the air-cells in which it was deposited. *b*. Bloodvessels. *c*. Single air-cells filled with tubercular matter.

with elongated or caudate nucleated cells. *Encephaloid*, which is the most common form of the disease, is soft, friable, often blood-stained and vascular. Microscopically it consists of cells having numerous large nuclei with a sparing amount of fine fibres. Cancer may take its rise in the bronchial glands, in the lung

itself, or it may be an extension of a similar growth situated in the breast or other adjoining parts. It is usually associated with malignant tumours in some other organ of the body.

72. From the above description of the morbid changes discovered in the lungs after death, you will be able to understand the physical signs indicating their presence during life.

73. When you strike upon a healthy chest, a clear sound is elicited, on account of the large amount of air contained in the lungs. But if the lung is emptied of air by being compressed by fluid, as in pleurisy, or by its cells being filled with lymph, as in pneumonia, it is evident that the sound on percussion will be no longer clear, but dull. When, on the contrary, the pleura is filled with air, or the cells of the lung are distended, as in emphysema, it is equally plain that the chest will be more resonant than in the healthy condition. In phthisis the amount of dulness will vary according as the air-cells are completely or only partially filled with tubercle.

74. A sound named the "vesicular murmur" is produced by the air rushing into and distending the air-cells and bronchi during inspiration. If from any cause the lung, or a portion of it, acts more energetically than usual, the murmur is increased; this is termed "*puerile respiration*," because in children the vesicular murmur is louder than in adults. If in any way the activity of the lung is lessened, the sound becomes feeble. The most general causes of feeble respiration are obstruction of the air-cells by tubercles, a loss of the elasticity of the lungs, as in emphysema, or some stoppage to the free passage of air through the larynx or bronchial tubes: the nature of these causes will be understood by a glance at the diagram on the opposite page.

75. In a healthy chest the sound produced by the air rushing through the bronchial tubes is masked by the loudness of the vesicular murmur; but if the air-

cells are extensively blocked up, as in pneumonia and phthisis, the bronchial sounds are plainly heard, forming "*bronchial* or *tubular respiration*." It will be evident that the character of the sound will vary with the size and shape of the passage which the air traverses, and consequently when a bronchial tube is much dilated, or ends in a cavity, we meet with "*cavernous respiration*."

76. The voice generated in a patient's larynx is imperfectly conducted by healthy lung, so that when your ear is placed upon the chest only a buzzing sound is audible whilst he speaks. But if the air-cells are

FIG. 7.

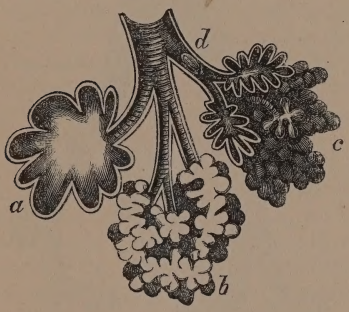


Diagram illustrative of the main forms of feeble respiration. *a*. From distension of the air-cells in emphysema. *b*. Deposits of tubercle in the air-cells. *c*. Collapse of the air-cells produced by the impaction of mucus in the bronchial tube at *d*. (DA COSTA.)

filled with solid materials, as in pneumonia, the voice is conducted to the ear through the bronchial tubes, and you hear the sound more distinctly ("increased vocal resonance," or "*bronchophony*"). If a cavity, or very large bronchial tube, is present, the force of the sound is further increased, and "*pectoriloquy*" is the result.

77. When air is forced along the polished lining of a tube, a soft sound is produced; but if the internal surface is roughened or contracted, the nature of the sound is altered. In bronchitis, when the mucous membrane is stripped of its epithelium, or films of hard mucus project here and there, or the calibre of the tube is altered, abnormal sounds, named "*dry râles*," result. The grave sounds generated in the larger tubes are named "*sonorous rhonchi*;" those of a more

FIG. 8.

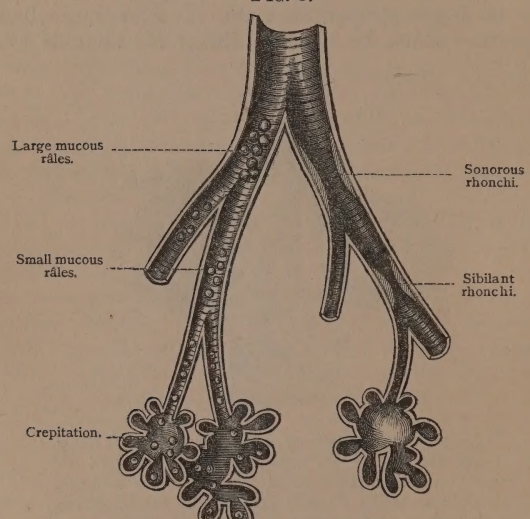


Diagram illustrative of râles in the bronchial tubes. The narrowing in the one division of the tube gives rise to dry, the fluid in the other to moist sounds (râles). (DA COSTA.)

piping or whistling character, arising in the more minute bronchi, are called "*sibilant rhonchi*."

78. When the bronchial tubes, or air-cells, are filled with liquid secretion, the air bubbles through it in passing to and from the lungs, and thus "*crepitations*,"

or *wet sounds* are produced. These are termed large or small crepitations, or "*mucous râles*," according to the size of the bubbles, and therefore of the air-passages in which they are generated. Many persons confine the term "crepitation" to the fine râles heard in pneumonia and produced in the air-cells, and call only the other larger moist sounds produced in the bronchial tubes "mucous râles." As small crepitations are not peculiar to pneumonia, I think it is simpler to call all the moist sounds large or small crepitations.

79. The walls of the chest vary in size, shape, and mobility, in accordance with the condition of the organs they contain. You will therefore find it necessary to measure the size of the chest in different diseases. The affected side is expanded in pleurisy and pneumothorax; it is contracted when a lung, compressed by effusion, has been incapable of expansion after absorption of the fluid. In phthisis the upper ribs generally fall in, and their mobility is lessened, from the summits of the lungs being affected with tubercle. In measuring the chest, mark with ink the central points over the spinal vertebræ and sternum, and between these points stretch a graduated tape on each side, taking care that the patient holds his breath in a forced expiration during the trial. Instruments have been invented to make the measurements more exact, but they are seldom required.

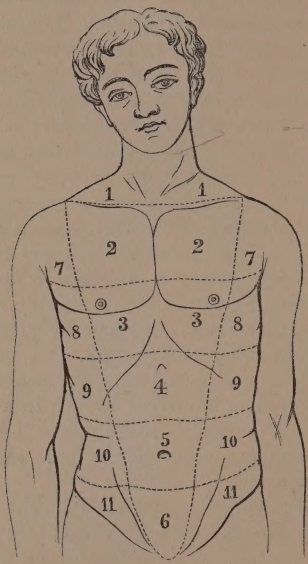
80. For the purposes of diagnosis the chest is supposed to be divided into regions, with which you should make yourself acquainted. The diagrams on pages 34 and 35 will best enable you to understand the limits of these regions.

81. The symptoms that should lead you to suspect the presence of disease in the lungs, are—pains of the chest or side, cough, expectoration, spitting of blood, (hæmoptysis), dyspnœa, sweatings at night, loss of flesh.

82. Accustom yourself to the examination of the *healthy* chest by means of percussion and auscultation.

83. As regards percussion, observe that, with the exception of the heart's space, the corresponding regions on each side of the chest sound equally clear. When the patient draws a full breath the percussion note is clearer, and in forcible expiration it is duller than in

Fig. 9.



1. Supra-clavicular.
2. Infra-clavicular.
3. Mammary.
7. Axillary.
8. Infra-axillary.

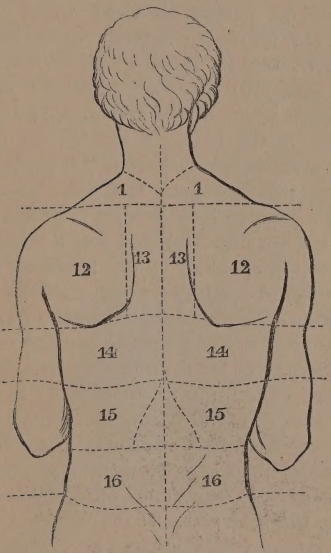
(Paxton.)

ordinary respiration. You must percuss more forcibly over and above the scapula, than on the front of the chest.

84. With regard to auscultation, first place the stethoscope over the *windpipe* of a healthy person. You

will find that there are two sounds accompanying the act of breathing, one produced by the air as it enters, the other as it leaves the chest. They are equal in length, and are both rough and harsh, and a distinct interval occurs between the commencement of the one and the cessation of the other. They constitute what

FIG. 10.



1. Supra-spinous.
12. Scapular or sub-spinous.
13. Inter-scapular (right and left).
14. Infra-scapular.

(PAXTON.)

is termed "*tracheal respiration.*" Next place the stethoscope on the *upper bone of the sternum*, opposite the point at which the trachea divides into the bronchi. Here the inspiratory sound is rather longer than that of expiration, both are softer and less hollow than over

the trachea, and they are separated by a slight, but appreciable interval. This is "*bronchial respiration*," or "*tubular breathing*." Again listen to the breathing in the other parts of the chest, and you will find that the sound of inspiration is soft and breezy; that of expiration is lower in tone, much less prolonged, and follows directly that of inspiration. This is termed the "*vesicular murmur*."

85. Direct the patient to speak when your stethoscope is in the above situations; over the trachea the words seem as though spoken into the ear, and even a whisper is distinctly heard. This is "*pectoriloquy*." Over the upper bone of the sternum, and in the interscapular region, the sound seems to be heard at the cup of the stethoscope. This is "*bronchophony*." In the other parts of the chest the voice produces a buzzing sound, which is often scarcely audible. Place your hand on the chest and you will feel a distinct *vibration* when the patient speaks ("vocal fremitus").

86. If possible examine your patients when in a sitting position. Take care that such of the clothes as are not removed are loose, for the rustling of flannel may be readily mistaken for sounds produced by disease.

87. Before examining a patient who is suspected to have a disease of the lungs, inquire if his complaint has been of short standing and came on suddenly (*acute*), or if its development was slow and gradual (*chronic*), or if he is subject to *occasional* attacks, his health being good during the intervals. If the disease is acute begin at (88); if chronic, pass on to (117), if occasional, pass on to (140).

SECTION I.

Acute Diseases of the Lungs.

88. The acute diseases of the lungs are pneumonia, pleurisy, pneumothorax, bronchitis, hooping-cough, acute phthisis. In all these complaints direct your attention first to the lower and back parts of the chest

below the scapula. Begin your examination with percussion.

89. *A. You find distinct dulness on percussion.* The disease is either pneumonia, pleurisy with effusion, or hydro-pneumothorax. If there is no dulness pass on to (100); or if you find abnormal clearness of sound pass on to (113).

90. *a.* You hear tubular breathing, or a fine crackling, or a bubbling sound with the inspiration, there is increased resonance of the voice, and increased vocal fremitus. The disease is *pneumonia.*

FIG. 11.

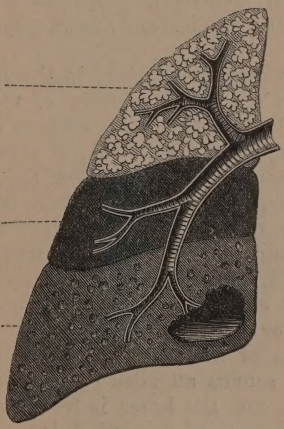

Slight percussion dulness; crepitation.
Engorgement and commencing hepatization.
Percussion dulness; tubular breathing; bronchophony; increased vocal fremitus.
Complete red hepatization.
Percussion dulness; tubular breathing; bronchophony; increased vocal fremitus; mucous râles.
Grey hepatization.

Diagram illustrating the signs of the different stages of pneumonia. An abscess is represented in the lower lobe. The physical signs are the same as those of a tubercular cavity. Abscess is rare in pneumonia.

91. The crackling and bubbling sounds are termed "*crepitations.*" They arise from bubbles of air passing through the fluid present in the air-cells (see fig. 8) and smaller bronchi, and are heard only in the beginning and decline (grey hepatization) of the disease. As soon as the lung becomes solid (red hepatization), you

have tubular breathing, or an absence of the respiratory sounds. The increased resonance of the voice and the increased vibration arise from the solid lung conducting the vocal sounds better than a healthy lung.

92. The general symptoms of pneumonia are those of fever, that is—thirst, hot dry skin, white tongue, little or no appetite, confined bowels, thick scanty urine. The patient generally lies on his back, has a frequent short cough, attended with *gluey, rusty-coloured or bloody expectoration*, dyspnœa, rapid breathing, quick, but soft pulse, and often delirium at night. If no pleurisy is present there is seldom much complaint of sharp pain. If pleurisy accompanies the pneumonia, you will find the physical and general signs of that complaint also.

93. The average temperature in the axilla in pneumonia is 104°, average rapidity of the pulse 120°, accompanied by about forty respirations in the minute, during the height of the disease; if these be exceeded the case is severe, if they are below the case is slight. During the height of pneumonia there is an absence of chlorides from the urine; you ascertain this by adding a solution of nitrate of silver to the urine, first acidified by nitric acid, and observing that no precipitate is produced. A crisis is apt to occur in pneumonia on the 4th, 6th, or 7th day of the attack.

94. Œdema of the lung presents small crepitation and bubbling sounds, attended by dyspnœa, cough, and expectoration, but the latter is frothy and thin, and there is an absence of decided dulness on percussion. Œdema generally arises from disease of the heart, kidneys, or liver.

95. You may have dulness on percussion and absence of respiration from collapse of the air-cells, as a sequence of bronchitis or fever. This is chiefly met with in children and old people. You distinguish this condition from pneumonia by the history of the case, the absence of rusty-coloured expectoration, and the rapidity with which the affection commences.

96. *b.* You find a diminution or absence of respiratory murmur, of vocal resonance, and of vibration. The disease is *pleurisy with effusion.*

97. The dulness and absence of respiration are caused by the lung being compressed against the spine by the fluid in the pleura. Consequently the extent

FIG. 12.

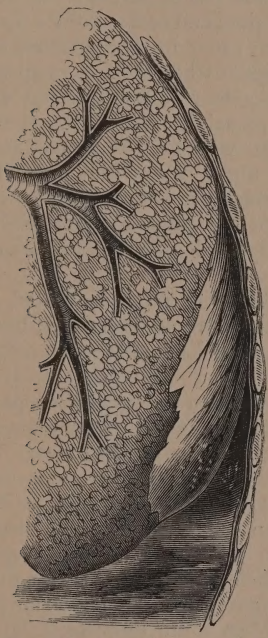


Diagram showing roughening of the pleura at the middle, and effusion of fluid at the lower part of the chest. (DOBELL.)

of the dulness corresponds with the amount of fluid. When there is a small quantity of effusion, the dulness may be only perceptible when the patient stands, and it disappears when you make him lie upon his face. In

other cases the whole side is dull. If the left side is affected the heart is often displaced, and can be heard to beat to the right of the sternum; when the right side has been attacked, the liver may be pushed downwards, and can be felt below the ribs. The affected moves less and measures more than the healthy side, and the spaces between the ribs are wider, flatter, or more bulging. In most cases tubular respiration can be heard in the interscapular region, and occasionally a peculiar bleating sound (ægophony) may be distinguished at the inferior angle of the scapula when the patient speaks. Friction sounds may be generally heard at an early period of this stage of pleurisy. If suppuration takes place (empyema) you will find the patient complain of shiverings and night sweats, the pulse becomes small and frequent, and there is rapid loss of flesh. As the fluid is absorbed the physical signs diminish. Eventually the affected side may be found shrunken in size and distorted.

98. The patient lies on the affected side, there is great dyspnœa, and rapid breathing, but there is not necessarily cough, and no rusty-coloured expectoration as in pneumonia.

99. The liver when enlarged may project upwards as far as the 4th rib, and thus simulate a partial effusion into the right side of the chest. You will find however, that the line of dulness in such a case is higher in front than behind, and that it descends on a full inspiration, and rises in full expiration, which is not the case in pleuritic effusion. Encephaloid disease of the whole lung also produces dulness on percussion, and absence of vesicular murmur; the dulness is, however, seldom quite uniform, small spaces being comparatively clear on percussion, there is not such a complete loss of vocal vibration, the sputa is often bloody or like currant jelly, and there may be evidence of malignant disease in other organs; there is also a more cachectic aspect than in pleurisy.

100. *B. There is no dulness on percussion.* It is

either pleurisy without effusion of fluid, bronchitis, hooping-cough, or acute phthisis.

101. *a.* The breath and voice sounds are normal, but you hear a superficial rubbing or grating sound accompanying the respiration. The disease is *pleurisy without effusion of fluid.*

102. The creaking is occasioned by the rubbing together of the roughened surfaces of the pleura (see fig. 12). Usually it accompanies both inspiration and expiration, but sometimes it can be only heard on full inspiration. It might be mistaken for the dry sound of bronchitis, and if there is any doubt on this subject, direct the patient to cough; this generally alters the sound in bronchitis, but leaves that of pleurisy unaffected.

103. The patient complains of dyspnœa and sharp pain of the side, increased by breathing. He lies on the unaffected side. The pulse is quick, often hard. There are symptoms of fever, short, hard cough, but no rusty-coloured expectoration. This stage of the complaint is generally followed by effusion into the pleura. Pleurisy sometimes occurs as a chronic disease, but the physical signs are the same as in the acute form.

104. You must remember that the sharp pain of pleurisy may be simulated by rheumatism of the muscles, or neuralgia, or severe pain in the side may be the precursor of an attack of herpes (shingles). In none of these are there fever, creaking on inspiration, or dulness on percussion.

105. *b.* You hear the breath sounds accompanied by dry or moist râles, and there is no alteration either in the voice or vocal fremitus.

The disease is *bronchitis.*

106. Accustom yourself to distinguish the dry from the moist sounds of bronchitis. For explanation of the manner in which they are produced see fig. 8. Crepitations may be simulated by the rubbing of the stethoscope on the hair of the chest, by the rustling of

clothes, and by air in the subcutaneous tissue (emphysema).

107. The patient complains of more or less fever, dull, oppressive pain of the chest, often referred to the sternum, cough, and expectoration. The expectoration is at first glairy, or frothy, semi-transparent mucus; afterwards opaque, or puriform. It is never rusty-coloured, as in pneumonia, although in acute cases it may be streaked with blood.

108. *c.* If in addition to bronchitis the patient is frequently attacked by suffocating cough which terminates in a long hooping sound, and is often attended with vomiting, the disease is *hooping-cough.*

109. This complaint is most common in childhood. The "hoop" is produced by the spasmodic closing of the glottis.

110. The characteristic cough is preceded for many days by fever, discharge from the nose and eyes, and the other symptoms of a "cold." It is not necessarily attended by bronchitis. The disease usually lasts six or eight weeks. In fatal cases the air-cells are generally found to be collapsed in different parts of the lungs, in others death results from convulsions.

111. *d.* If along with the physical and general signs of bronchitis the patient has severe fever, a brown tongue, rapid loss of flesh and strength, and night sweats, you may suspect *acute phthisis.*

112. Acute phthisis usually runs its course in from three to ten weeks. In all these cases examine the expectoration for lung-tissue. Unless you find it you are not justified, in the absence of the physical signs of phthisis, in giving a positive diagnosis. Sometimes the disease is ushered in with the general and physical signs of *pneumonia*, but the dulness and other signs subside very slowly, rapid emaciation and night sweats come on, or severe hæmoptysis indicates the true nature of the case.

113. *C. Percussion elicits a clear note like that of a drum over one side of the chest* (tympanitic sound). You can have only one acute disease of the chest, viz., *pneumothorax.*

114. *a.* The respiratory sounds, vocal resonance, and vibration are greatly diminished or are absent, there is convexity of the affected side, bulging of the intercostal spaces, immobility or diminished motion of the ribs, and often displacement of the heart. The disease is *pneumothorax.*

FIG. 13.

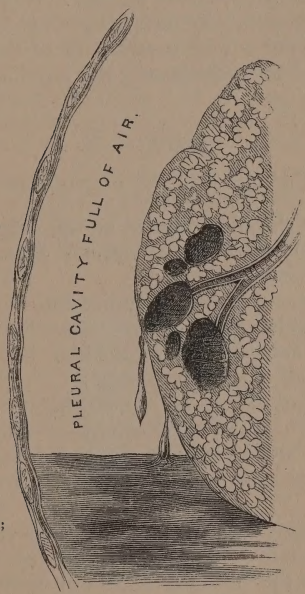

Percussion tympanitic; absent respiration; absent vocal resonance; absent vocal fremitus.
PLEURAL CAVITY FULL OF AIR.
Splash on succussion; percussion dulness; metallic tinkling.

Diagram of the physical signs in pneumothorax. (DOBELL.)

115. The air in the pleura compresses the lung and thus prevents the respiration in the same way as the fluid of pleurisy does. Inflammation is usually set up in the pleura, and you therefore often find dulness on percussion, from fluid at the base of the chest, and abnormal clearness above. Sometimes you will find a loud echo

with the voice ("amphoric voice"), and a tinkling sound as if produced by the dropping of fluid in a cavity. In other cases, when the patient moves or is shaken, a loud splashing sound is produced.

116. In the majority of instances the air is admitted into the pleura by the bursting of a small cavity; consequently the signs of pneumothorax are usually preceded by the symptoms of phthisis. When the rupture occurs, as it generally does after coughing, the patient is seized suddenly with severe pain of the side, intense dyspnœa and great faintness; the pulse being weak and fluttering.

SECTION II.

Chronic Diseases of the Lungs.

117. The chronic diseases of the lungs are chronic pleurisy (96), hydrothorax, phthisis, chronic bronchitis, and emphysema.

118. Commence your examination with percussion. If you find dulness on percussion begin at (119); if you find no dulness pass on to (134), if the percussion is abnormally clear pass on to (137).

A. You find dulness on percussion.

119. *a.* The dulness is chiefly or entirely confined to the lower and back parts of the chest, and is associated with absence of respiration, of voice sounds, and of vibration.

The disease is either *chronic pleurisy* or *hydrothorax.*

120. As there is effusion of fluid into the pleura in hydrothorax the physical signs are similar to those of pleurisy with effusion (96). To distinguish between these, remember that pleurisy generally affects only one, but hydrothorax both sides of the chest; that the invasion of the former is sudden, attended with pain, and in the first stage presents friction sound, whilst the latter occurs only as a part of general dropsy, or as a consequence of disease of the heart or kidneys.

121. If you find no dulness at the lower part of the

chest percuss very carefully the clavicles, the subclavicular and supra-spinous regions. Compare the resonance of the corresponding regions on each side, and if you have any doubt as to the existence of dulness, examine during a full inspiration and forced expiration (83). Observe also whether both infra-clavicular regions expand equally during inspiration; this can be done by placing the hand on the part, or by measuring with a tape or calipers. Compare the relative lengths and the tones of the inspiratory and expiratory murmurs in the infra-clavicular, supra-clavicular, and supra-spinous regions on either side. This you can do either by placing the ordinary stethoscope alternately on the same region on each side, or by listening to both sides at the same time with Dr. Scott Alison's "differential stethoscope." Remark if the inspiratory sound, instead of being continuous, proceeds in a "jerking" manner, or if it be in any place "tubular;" also if after a full inspiration a slight "click" occurs at the end of it. Compare also the resonance of the voice on each side. You will often find it useful to direct the patient to cough, and directly afterwards to draw a full breath.

122. *b.* The dulness is in the upper regions of the chest, and is attended either with feeble inspiration, increased expiration, harsh inspiration, "jerking inspiration," tubular respiration, dry clicking, increased vocal resonance, lessened mobility, or diminished fulness below the clavicles.

The disease is probably *consolidation of the lung by tubercle.*

123. You must not conclude that there is no tubercular consolidation because you do not at once detect the physical signs of this condition. If the general symptoms are indicative of phthisis you must examine the chest from time to time before giving a decided diagnosis.

124. General symptoms of the first stage of tubercle in the lungs (consolidation). Cough, chiefly in the mornings, expectoration, generally small in amount, of ropy or glairy mucus, hæmoptysis, slight dyspnœa on

exertion, general languor, loss of flesh, night sweats, pulse increased in frequency. Examine the gums and see if there is a red line next the teeth, also the nails if they are curved downwards at their ends (filbert nails); for both of these signs are apt to accompany phthisis. Hæmoptysis is the most suspicious symptom; if the patient is free from heart disease, and if, in case of a female, she is not suffering from disordered menstruation, the occurrence of hæmoptysis almost always indicates

FIG. 14.

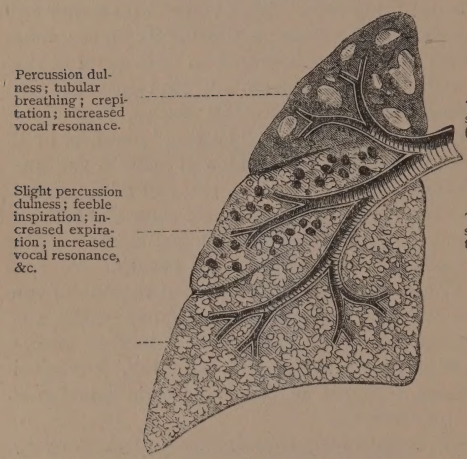

Percussion dulness; tubular breathing; crepitation; increased vocal resonance.
Slight percussion dulness; feeble inspiration; increased expiration; increased vocal resonance, &c.
Tubercle in second stage (softening).
Tubercle in first stage (consolidation).

Diagram showing the signs of tubercle in the first (consolidation), and second (softening) stage of tubercle.

the presence of tubercle in the lungs. Inquire if any other members of the patient's family have suffered from phthisis, and in all cases of doubt examine the expectoration for lung tissue (145). Ascertain also the temperature, for if it be persistently high (103° to 104°), and no other disease likely to account for the increased heat be present, there is a great probability of tubercle.

125. *c.* The dulness on percussion is over one or both apices of the lungs, and is accompanied by crepitation, tubular breathing, and increased vocal resonance.

The *tubercle is in the stage of softening.*

126. The crepitation arises from the air passing through tubes, air-cells, and minute cavities filled with fluid. The dulness and increased vocal resonance show that the disease is not simple bronchitis. In case you have only doubtful dulness, and find crepitation confined to the upper parts of the lungs, examine the sputa for lung tissue. In this stage you can generally detect a certain amount of flattening below the clavicle, and deficient movement in one or both sides.

127. Cancer of the lung presents the general symptoms of phthisis, with dulness on percussion, and tubular respiration. It is, however, usually attended with more persistent hæmoptysis, no lung tissue can be found in the sputa, and in most cases cancer exists at the same time in some other organ of the body.

128. *d.* The dulness on percussion is over one or both apices of the lungs, and is accompanied by tracheal sounds of the breath (cavernous respiration) and voice (pectoriloquy), or by a splash when the patient coughs.

There is *a tubercular cavity of the lung.*

129. The tracheal sounds of the breath and voice show that the cavity is at least partially empty; when there is a splash (gurgle) on coughing, the cavity contains both air and fluid.

130. As phthisis progresses, the cough and expectoration increase, the emaciation becomes more rapid, the night sweats more regular and profuse. There are frequent attacks of pain in the chest or sides from pleurisy, the pulse rises in frequency, the tongue is covered with aphthæ, vomiting distresses the patient, especially in the morning, and œdema of the feet, and severe attacks of diarrhœa occur.

131. The physical signs of this stage are the same as when a cavity has been produced by pneumonia, which is, however, rare. In such a case the cavity is

usually at the base of the lung, and you have the history of pneumonia to guide you (92).

132. You may have the physical signs of a cavity in cases of dilated bronchus (see fig. 15); but the general symptoms are of less severity, there has been no hæmoptysis, no lung-tissue can be found in the expectoration, and the dilatations are usually confined to the base of the lung or the mammary regions.

FIG. 15.

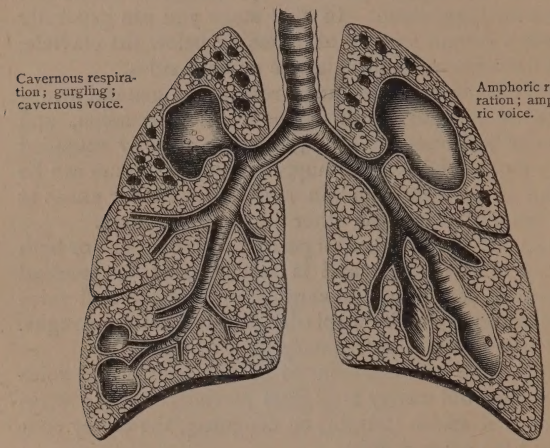


Diagram showing tubercular cavities and enlarged bronchial tubes; those on the left hand are represented as partly full of fluid, those on the opposite side as empty. (Modified from DA COSTA.)

133. When a large empty cavity exists near the surface of the lung, you often have a very clear sound on percussion, and amphoric respiration and voice.

134. *B. The percussion note is normal*, but you find the respiration accompanied by dry or moist sounds.

The *disease is chronic bronchitis.*

135. Chronic bronchitis differs from the acute form

of the disease in its slower progress, and in its symptoms being less severe. When the dry or moist sounds are confined to the apices of the lungs, even if there be no dulness on percussion, you ought to suspect the presence of tubercle, and should examine the sputa for lung-tissue. You may have the physical signs of a cavity from dilated bronchi; but in such cases they are generally discovered in the mammary or infra-scapular regions, and not at the apices of the lungs (132).

136. All the *general symptoms* of phthisis may be present in chronic bronchitis (night sweats, emaciation, &c.), excepting profuse hæmoptysis; the difference in the physical signs, and the absence of lung-tissue in the expectoration, will serve to distinguish between these diseases.

137. *C. The percussion note is abnormally clear on both sides of the chest*, the respiratory sounds are feeble and indistinct, or they may be attended with the sounds of bronchitis (77 and 78), or there is a prolonged and hoarse sound on expiration; the resonance of the voice is lessened, the shape of the chest is altered, and the ribs move but slightly.

The disease is emphysema.

138. The heart's space is generally clear on percussion, and posteriorly a clear sound is elicited, even to the lowest ribs. The liver may be often felt below the ribs on the right side, and the heart is not unfrequently pushed downwards, so that though its impulse cannot be detected in its usual place, it is seen to pulsate in the epigastrium. These changes result from the increased distension of the lungs. As bronchitis is usually also present, the auscultatory signs of this affection are generally associated with emphysema.

139. The chief symptoms of emphysema are dyspnœa, attacks resembling those of asthma, cough and expectoration, and, in the later stages, dilatation of the heart often takes place, and dropsy supervenes.

SECTION III.

The Attacks are only Occasional.

140. Attacks of bronchitis may be occasional, but asthma is the usual disease included under this head.

141. *a.* During the attacks the percussion note is clear, the respiratory murmur is very feeble, or mixed with sonorous and sibilant rhonchi.

The disease is asthma.

142. The attacks of dyspnœa are generally followed by bronchitis, from which the patient recovers for a time, until a fresh seizure again prostrates him.

143. The general symptoms at once distinguish asthma from ordinary bronchitis. There is great tightness of the chest and intense dyspnœa; the patient lays hold of any steady object near him so that he may bring into play all the powers of respiration; the face is pallid, perspiration rolls down the brow, and you might even expect that death would soon take place. The complaint often accompanies heart disease and emphysema of the lungs.

144. The spirometer is sometimes used to ascertain the state of the lungs in suspected cases of phthisis. It consists of a vessel filled with water, to which a scale is attached. When a person blows through the tube leading into it, the water is displaced, and the vessel on rising marks on the scale the number of cubic inches of air expelled from the lungs. The patient before blowing must take as full an inspiration as possible. Dr. Hutchinson laid down the rule that the breathing volume for a healthy man five feet high is 174 cubic inches, and that eight cubic inches should be added to this for every inch above five feet. It is not much to be depended upon as a means of diagnosis, for the above rule is not perfectly trustworthy, and few persons can expire to the full extent without some practice.

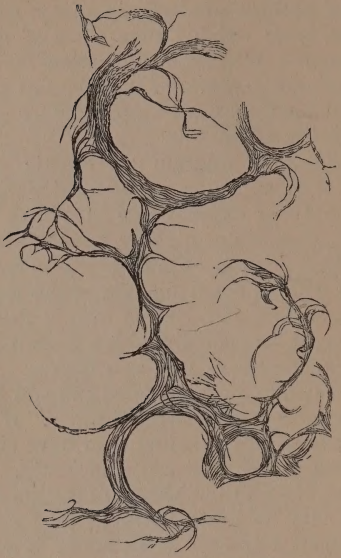
145. The microscope is a most valuable aid in the diagnosis of phthisis—indeed, in many cases its indications are more reliable than those of auscultation and percussion. Whenever ulceration takes place in the lungs, minute particles of these organs are expelled in the sputa, and these can be separated for examination by the following method:—

146. Prepare a solution of caustic soda, about twenty grains to an ounce of distilled water. Collect all the patient has expectorated in twelve or twenty-four hours—from ten at night to ten the next morning being the best period. Pour this, previously mixed and shaken with an equal quantity of the soda solution, into a glass beaker, and boil it over a gas or spirit-lamp, stirring it occasionally with a glass rod. A test-tube does not answer so well as a beaker. As soon as it boils pour it into a conical glass and add four or five times the amount of cold distilled water. If the mucus is still gelatinous after boiling, you have either added too little soda or not boiled it sufficiently. The cold water carries down to the bottom of the glass any lung-tissues that may be present, where they form a slight deposit in about a quarter of an hour; if no deposit is visible, put the glass aside for two or three hours. Remove the deposit with a dipping-tube, place it in a glass cell,* cover it with a piece of thin glass, and examine it with a one-inch object glass. The lung-structures will be often found clinging to hairs and other foreign bodies present in the sputa.

147. The air-cells have the appearance presented in the accompanying drawings, and are distinguished by the number and arrangement of the fine fibres of which they are composed; sometimes they are expelled in groups of twenty to thirty cells, at others only portions of single cells are visible. Bronchial tubes may be recognised by their branching form, and are sometimes

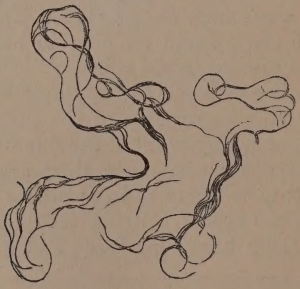
* Proper cells and the other apparatus may be obtained at Messrs. Murray and Heath, opticians, Jermyn-street.

FIG. 16.



Drawing of a group of air-cells as seen under the microscope.

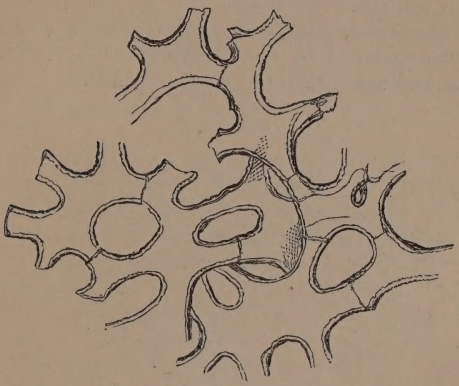
FIG. 17.



Drawing of single cells, the fibres of which are unravelled, as seen by the microscope.

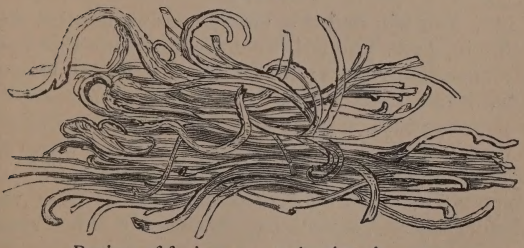
accompanied by fragments of bloodvessels. When only small crepitations can be heard in the lungs, the greater part of the deposit will be found to consist of air-cells; where the signs of a cavity are present you will meet with portions of the bronchial tubes in the sputa; frag-

FIG. 18.



Portions of vegetable structure as seen under the microscope, liable to be mistaken for air-cells.

FIG. 19.



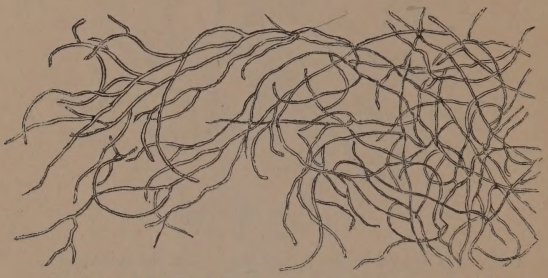
Portions of fascia as seen under the microscope.

ments of the bloodvessels can be rarely detected excepting just before or during an attack of hæmoptysis.

148. A few examinations will enable you to recognise

quickly and certainly the lung-structures; but at first you must be careful not to confound them with portions of vegetable and animal structures that may be present in the sputa. A piece of the cellular part of a vegetable is represented in fig. 18; you will observe in it the regularity of the size and shape of the cells, the thickness of their walls and the absence of fine fibres. Portions of the fibrous structures of other organs may be generally distinguished by the coarseness of the fibres and the want of cellular arrangement (fig. 19).

FIG. 20.



Portions of fungi, often found in sputa, as seen under the microscope.

149. You will find this method of examination most useful in acute phthisis, when other means afford you only uncertain results; in chronic catarrh and emphysema, where tubercle has been slowly developed and its signs are masked by those of the previous disease; in that large and difficult class of cases in which the physical signs point only to bronchitis, while the symptoms indicate consumption. It is also very valuable where frequent hæmoptysis and other symptoms leave you in doubt whether you have to deal with phthisis or cancer of the lung, and it is often the only means of diagnosing with certainty a dilated bronchial tube from a tubercular cavity.

CHAPTER IV.

DISEASES OF THE THROAT AND LARYNX.

150. The fauces are very liable to inflammation. You will meet with it in catarrh, scarlatina, and other diseases.

151. In Tonsillitis, or inflammation of the tonsil, the gland is greatly swollen, and the neighbouring mucous membrane is of a bright red colour and covered with mucus. It generally terminates in abscess, which bursts into the throat. It is not uncommon for the tonsils to be permanently enlarged. Microscopically, they present a considerable quantity of fibrous tissue in addition to an increase in their normal glandular structures. The surface of the gland is often covered with small pits containing plugs of cheesy secretion.

152. Diphtheria is a contagious febrile complaint, in which the throat affection is secondary to the disease of the blood. The throat is coated with a thick, rough membrane of a dirty-white colour, that is quickly renewed if torn off. The mucous membrane below the exudation is of a dark red colour, it seems swollen, and, as the complaint advances, it is apt to slough.

153. Œdema of the Larynx consists in an effusion of lymph or serum beneath the mucous membrane of the larynx or epiglottis, resulting from inflammation. It often causes death by obstructing the entrance of the air into the lungs.

154. Croup is characterized by the formation of a false membrane in the larynx and trachea, which sometimes extends into the bronchial tubes. When

the membrane is peeled off, the surface looks red, rough, and swollen. The disease is often associated with bronchitis or pneumonia, is usually attributable to cold and damp, and the constitutional symptoms are secondary to the local affection.

155. THE LARYNX is subject to chronic inflammation and ulcerations, chiefly the result of syphilis or phthisis. Tumours are not unfrequently found, generally in the neighbourhood of the vocal cords.

156. STRICTURE OF THE ŒSOPHAGUS is rare, excepting as the result of cancer or aortic aneurism. In some cases ulceration is produced by the patient swallowing corrosive fluids, a contraction ensuing in the new tissues when the ulceration heals. Occasionally you will find a small cancerous tumour developed in the coats of the œsophagus, causing the stricture; but this part is generally affected with the epithelial form of cancer. In such a case you meet with an elevated warty tumour of irregular shape surrounding the tube, sometimes uniting the œsophagus to the spine, at other times ulcerating into the trachea or neighbouring organs.

SECTION I.

DISEASES OF THE THROAT AND ŒSOPHAGUS.

157. The chief symptoms that should induce you to suspect disease of the throat or œsophagus are pain or soreness of the throat, swelling of the glands below the jaw or in the neck, difficulty or pain in swallowing. You must examine the throat in all cases in which you suspect it to be affected, by depressing the tongue with a spoon or spatula whilst your patient is sitting opposite a bright light.

158. *a.* You observe the mucous membrane of the throat of a red colour, with patches of ulceration. The tonsils are not greatly enlarged.

The disease is *inflammation of the throat.*

159. The general symptoms vary according to the

cause producing the inflammation. Thus, it may have arisen from catarrh, from the application of irritating substances, or from constitutional diseases, such as scarlatina, measles, syphilis, or phthisis. In eruptive fevers the state of the skin is sufficient to show the nature of the throat affection; syphilis is generally attended with ulcerations, round, deep, and with elevated edges, or they are superficial and irregular in shape; chronic inflammation of the back of the pharynx is a very common result of phthisis. An elongated uvula often keeps up a chronic cough.

160. *b.* One or both tonsils is of a red colour, swollen, and tender on pressure, the uvula is enlarged, and the fauces filled with mucus; there is great difficulty in swallowing. The pulse is quick, the tongue very foul, and the skin hot.

The disease is *tonsillitis* (quinsy).

161. The amount of fever varies greatly in different cases, but it is usually severe; the disease often terminates in suppuration, and is apt to recur from time to time. There is no fever with the chronic enlargement of the tonsils, the glands project into the fauces and obstruct free respiration; it is often accompanied by deafness.

162. *c.* You see the palate, fauces, or pharynx of a vivid red colour, coated in parts with a thick exudation, which, when peeled off, leaves the subjacent membrane red and bleeding, and is soon renewed. There is great depression of strength, a quick, small pulse, hot dry skin, thirst, and loss of appetite.

The disease is *diphtheria.*

163. The urine is generally albuminous, sometimes bloody. The disease is ushered in with slight fever, swelling of the submaxillary and cervical glands, soreness of the throat, and fœtor of the breath; it usually terminates in from eight to fourteen days. Sometimes the false membrane extends into the larynx and bronchial tubes; in other cases the disease is complicated with pneumonia. Convalescence is commonly slow.

Within three weeks after recovery diphtheria is apt to be followed by paralysis of the throat, face, eye, or limbs.

164. *d.* There is no apparent affection of the throat, but the patient is unable to swallow solid food, excepting in small morsels. A bougie, passed down the œsophagus, meets with an obstruction.

The disease is *stricture of the œsophagus.*

165. Stricture of the œsophagus always comes on gradually, and is attended with great emaciation. The attempt to swallow produces pain, and usually the food is rejected immediately. Before introducing a bougie, be careful to ascertain that the symptoms are not produced by an aortic aneurism (51). In cancer you will generally find a quantity of mucus rejected with the food, the examination of which with the microscope may enable you to discover particles of cancerous growths.

166. Difficulty of swallowing may arise from paralysis or dyspepsia, without stricture; but the other symptoms of these diseases, and the ease with which the bougie can be passed, will prevent mistakes. In spasm of the œsophagus the symptoms come on suddenly, and recur from time to time.

SECTION II.

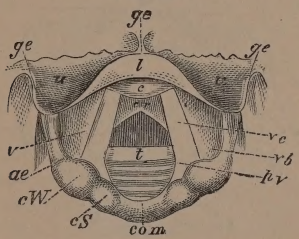
Diseases of the Larynx.

167. The laryngoscope is necessary for the examination of the larynx and trachea. It consists of a concave mirror, which is either fixed in a spectacle-frame, or is attached to the forehead by an elastic band, and of a smaller mirror mounted on a long wooden handle.

168. The patient must be placed upon a chair, with a lamp on one side and a little behind him, his neck inclined slightly backwards, and the face turned a little upwards. Seat yourself opposite to him, with the concave mirror adjusted to your eye or forehead, ac-

cording to the way in which it is mounted, direct him to open his mouth widely, and throw the light reflected from the mirror into the fauces, so that the centre of the disc may correspond with the base of the uvula. Grasp the end of his tongue with the thumb and forefinger of your left hand enveloped in a fold of soft cloth or towel, gently draw it from the mouth and hold it steadily. Next warm the back of the small, or laryngeal mirror, for a few seconds over the lamp, and touch your own cheek with it to prove that it is not too hot. Holding its handle in the right hand like a pen, pass it into the fauces, slightly raise upwards the uvula with its back, direct the light reflected from the concave

FIG. 21.*



Laryngoscopic drawing showing the vocal cords drawn widely apart, and the position of the various parts above and below the glottis during quiet inspiration.

g. e. Glosso-epiglottidean folds.	*c. S.* Capitulum Santorini.
u. Upper surface of epiglottis.	*com.* Arytenoid commissure.
l. Lip of epiglottis.	*v. c.* Vocal cord.
c. Cushion of epiglottis.	*v. b.* Ventricular band.
v. Ventricle of larynx.	*p. v.* Processus vocalis.
a. e. Ary-epiglottidean fold.	*c. r.* Cricoid cartilage.
c. W. Cartilage of Wrisberg.	*t.* Rings of trachea.

mirror upon its surface, request the patient to draw a full breath, and then to say "ah," and you will have upon the laryngeal mirror a view of the interior of the larynx.

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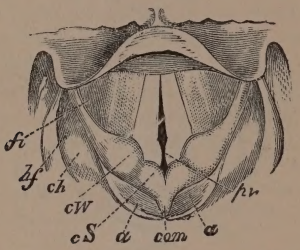
* Figs. 21 and 22 are copied from Dr. Mackenzie: "Use of the Laryngoscope."

169. In a healthy larynx you will observe that the colour of the mucous membrane is slightly red, and that the vocal cords are white. The preceding drawings show the various parts visible with the laryngoscope.

170. When you suspect disease of the larynx, first remark the colour of the mucous membrane, and if there are any ulcerations; see if there is any tumour, either in the neighbourhood of the glottis or upon the vocal cords; afterwards, by directing the patient to say "ah—eh," you will be able to ascertain whether the vocal cords approximate during speech in the normal manner.

FIG. 22.



Laryngoscopic drawing showing the approximation of the vocal cords and the position of the various parts in the act of vocalization.

f. i. Fossa innominata.
h. f. Hyoid fossa.
c. h. Cornu of hyoid bone.
c. W. Cartilage of Wrisberg.
c. S. Capitulum Santorini.
a. Arytenoid cartilages.
com. Arytenoid commissure.
p. v. Processus vocalis.

171. *a.* A child is affected with great dyspnœa, aggravated in paroxysms, rapid breathing, loud brazen cough, hoarse voice, quick pulse, thirst, and hot dry skin.

The disease is *croup.*

172. The dyspnœa arises, not only from the formation of a membrane in the larynx, but also from spasm of the glottis, set up by the inflammation.

173. Croup is a disease confined to childhood, and is ushered in by hoarseness of the voice and loud ringing cough. In fatal cases the dyspnœa increases, the respiration becomes quick and laborious, the pulse small and thready, the face pale, the lips blue; death is often preceded by convulsions. In some cases cylindrical casts of the trachea are expelled. In adults the symptoms of croup are produced by laryngitis; but no false membrane is formed in the air-passages.

174. "*False croup*" is a term applied to a spasmodic affection of the windpipe, to which young infants are subject. In it the child awakes from its sleep, or is suddenly attacked when awake, with a loud crowing inspiration, which sometimes terminates in suffocation; in other cases it passes off as rapidly as it came on. It is a nervous disorder, and liable to be excited by various causes of irritation acting on the nervous system.

175. *b.* The mucous membrane of the larynx is abnormally reddened, and presents small ulcerations in different parts. The patient complains of hoarseness or loss of voice, cough, and expectoration.

The disease is *ulceration of the larynx.*

176. Inflammation of the mucous membrane of the larynx may occur as an acute or chronic affection. It often results from catarrh, but its most severe forms are met with in persons suffering from phthisis. It may present itself in the early stages, but it usually occurs towards the close of that disease, and adds greatly to the sufferings of the patient. In other cases ulceration is the result of syphilis.

177. *c.* You find a red, semi-transparent swelling of the epiglottis, or of the ary-epiglottic folds.

The disease is *œdema of the glottis.*

178. Œdema may exist as an acute or chronic affection of this part, in the latter it is most frequently caused by disease of the cartilages; in either case its symptoms are distressing, and its issue often fatal. There are generally present intense dyspnœa, hoarseness or loss of voice, cough, and difficulty of swallowing.

179. Various forms of tumours occur in the larynx, chiefly in the vicinity of the vocal cords; they are usually of a warty or fibroid character.

180. *d.* One or both of the vocal cords is motionless, and remains stationary at the side of the larynx when the patient attempts to speak, although the parts seem otherwise normal.

The disease is named *aphonia.*

181. Simple aphonia most commonly results from hysteria or debility. In cases where the recurrent nerve is pressed upon by an aneurism or glandular tumour, dyspnœa is a more marked symptom than aphonia. Aphonia is the result of a temporary or permanent paralysis of the muscles which approximate the vocal cords in speaking; in the dyspnœa dependent on laryngeal paralysis, the opposite set of muscles are affected to those used in vocalization. It is characteristic of this form of laryngeal dyspnœa that it becomes very marked on exertion.

CHAPTER V.

DISEASES OF THE KIDNEYS.

182. The chief diseases to which the kidney is liable are congestion, suppurative nephritis, acute and chronic tubular nephritis, fatty and amyloid degenerations, intertubular nephritis, dilatation, and tubercular and cancerous diseases.

183. Congestion of the Kidney.—The organ is of a dark red colour, and is much increased in size. On a section being made, blood flows freely from it, and its substance, as well as the mucous membrane of the pelvis and calyces, is much congested. Congestion of the kidney generally arises from disease of the heart or lungs.

184. Suppurative Nephritis, or inflammation of the kidney terminating in suppuration, is a rare disease, excepting as the result of some affection of the bladder or urethra, of pyæmia, or of inflammation set up by a calculus. The morbid appearances are those of congestion, attended by deposits of pus, chiefly in the cortical part. The mucous membrane of the pelvis is much inflamed, and covered with muco-purulent secretion (pyelitis).

185. Acute Tubular Nephritis, or "Acute Desquamative Nephritis."—The kidney is much increased in size and weight, its capsule is readily removed, the surface appears irregularly congested, and displays here and there minute red spots or patches. Microscopically, the tubes are filled with epithelial cells, intermixed with fibrine, or blood-corpuscles. The contents of the tubes, when washed away by the urine, constitute the fibrinous and cellular casts characteristic

of the disease. The capsules of the Malpighian bodies are sometimes filled with blood; generally, their capillaries are greatly congested.

186. Chronic Nephritis.—Much confusion has arisen from various chronic disorders of the kidney having been described under the name of "Bright's disease." At least four different forms of disease appear to have been thus confounded—viz., chronic tubular nephritis, or, as it is called by others, "chronic desquamative nephritis," fatty kidney, amyloid kidney, and intertubular nephritis, or "granular kidney." In all of these albumen is found in the urine.

187. Chronic Tubular Nephritis, often called the "Large White Kidney."—The organ is much increased in size, the capsule peels off readily, the surface is white and smooth, with patches of red colour or arborescent veins upon it. On section, the cortical part is seen to be much increased in depth, of a pale yellow colour, and markedly striated; the pyramids are often congested. Microscopically, the tubes are dilated and greatly distended with cells, fatty and granular matters; at a later stage they lose their lining membrane, and become atrophied. The Malpighian bodies are more opaque than usual.

188. Fatty Kidney presents morbid appearances similar to those of chronic tubular nephritis; but on microscopic examination, fatty matters are found in great quantity in the cells of the tubes, and upon the capillaries of the Malpighian bodies. The colour of the whole gland is generally very pale.

189. Amyloid, Albuminoid, or Waxy Degeneration of the Kidney.—The kidney is usually large and hard, and, on section, it has a more or less translucent, waxy, bloodless appearance; a solution of iodine stains the tissues of a reddish-brown colour; the smaller arteries are generally thickened. This disease is usually associated with a similar condition of the liver and spleen in persons affected with phthisis, caries of the bones, or other wasting disorders.

190. Intertubular Nephritis, "Granular," or "Contracting Kidney."—The whole organ is much reduced in size; the capsule is thickened, adheres firmly, and on being peeled off leaves portions of its tissue on the exterior of the gland. The surface is irregularly covered with small prominences; in other cases "cysts" are apparent. On a section being made, the cortical part is seen to be much reduced in thickness, and the whole structure is tough, coarse, and fibrous. Microscopically, the Malpighian bodies are atrophied, the connective tissue greatly increased, the tubes are shrunk, and often distorted, the smaller arteries much thickened and enlarged. In some cases cysts exist in such numbers that the whole organ seems to be composed of them.

191. Dilatation of the Kidney.—In an extreme degree of this disease the organ is much increased in size, is lobulated, and seems as if converted into a bag of pus or urine. On a section being made, the cortical part is so greatly atrophied that it can be scarcely recognised; the medullary portion is compressed and flattened, the pelvis and infundibula are dilated, and their lining membrane is raw and congested. The disease is produced by the flow of urine being obstructed by a calculus, or by some affection of the ureters, bladder, or urethra; in other cases it results from tubercular affection of the pelvis of the kidney.

192. Tubercular Disease of the Kidney.—In some cases, the deposits exist in the form of small scattered tubercles in the cortical part of the gland. In others, the whole organ is destroyed, and, after death, you find the capsule enclosing a putty-like mass of tubercular matter intermixed with the scanty remains of the original structures. The disease occasionally commences by tubercular deposits in the pelvis of the kidney.

193. Cancer of the Kidney is chiefly of the encephaloid kind. It generally begins in the neighbouring lymphatic glands, and often forms a tumour in the abdomen of large size.

194. The symptoms that should lead you to suspect disease of the kidneys are, anæmia, dropsy, vomiting in the early morning, frequent attacks of bronchitis, diarrhœa, dyspepsia, or convulsions. Indeed, as most of the diseases of this organ are unaccompanied by pain, it will be advisable for you to ascertain the state of the kidneys in any case in which the symptoms are obscure or threatening. The urine supplies you with the best means of determining if the kidney is healthy; you should therefore practise yourself in the examination of it as carefully as in auscultation and percussion.

195. Observe the colour of the urine, whether it is of lighter or darker tint than usual, or if it is tinged with blood or bile.

196. Ascertain its specific gravity; float in it a urinometer, and observe what number on the scale is on a level with the upper surface of the liquid. The urinometer is so constructed that it floats with the index at zero when placed in distilled water. The specific gravity of healthy urine is from 1015 to 1025.

197. Test for the presence of albumen; boil a small portion of urine in a test-tube, and add a few drops of nitric acid. If albumen is present the fluid becomes opaque. Observe the proportion of albumen when it has fallen to the bottom of the tube; as, for instance, about one-quarter or one-sixth of the liquid examined. If you find albumen, begin at (200).

198. If you do not find albumen, next test for sugar. Pour into a test-tube a small quantity of the urine, add to it a few drops of a dilute solution of sulphate of copper, and about half as much liquor potassæ as urine, and boil the mixture; if sugar be present a reddish-brown precipitate of suboxide of copper will be deposited. If you find this, pass on to (238).

199. Although neither albumen nor sugar be present, you may still derive much information from a further examination of the urine; pour a portion of it into a conical glass, and pass on to (243).

SECTION I.

You find the Urine Albuminous.

200. You must not conclude that the patient has a disease of the kidneys, because you find albumen in his urine, for this may arise from fever, gout, cholera, pregnancy, and many other conditions; but if, after frequent examinations, you find albumen, pus, or blood, or if along with the albumen there are "tube casts" in the urine, and the general symptoms of kidney disease are well marked, you may safely diagnose a morbid state of the urinary organs.

201. Examine the urine for casts of the uriniferous tubes; pour some of it into a conical glass, and set it aside for a few hours; remove with a dipping-tube a small quantity of the deposit at the bottom of the vessel and place it on a slide, cover it with a piece of thin glass, and examine it with the microscope. You can detect casts of the tubes with a one-inch object glass, but a half-inch or quarter-inch objective will enable you better to study their characters.

202. The casts appear under the microscope as long narrow tubes; they are formed by the coagulation of the albumen or fibrine of the blood in the uriniferous tubes, and when washed away by the urine, carry with them portions of the epithelium. Thus you may judge to a certain extent of the condition of the secreting part of the kidney by the appearances presented by the casts.

203. There are three principal forms of casts.

"*Transparent*," "*hyaline*," or "*waxy*" *casts*, in which there is no trace of structure. These, as represented in 3, fig. 23, may easily escape observation; they are best brought into view by throwing the light upon them obliquely, or by adding a drop of solution of iodine to the specimen.

"*Cellular casts*" are covered by the cells of the uriniferous tubes, as at *b*, fig 26. Their presence shows

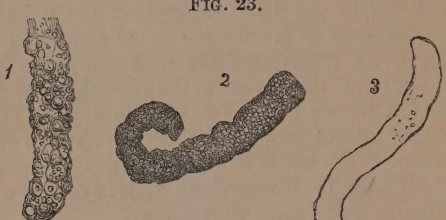
that the tubes are still lined by epithelium, and that the disease is recent.

"*Granular casts*" are produced in tubes whose epithelium is undergoing disintegration (see 2, fig. 23). In many recent cases you may meet with casts granular from the deposition upon them of urate of ammonia, but they become transparent when warmed.

Casts loaded with fat, if numerous, indicate fatty degeneration of the kidney (see 1, fig. 23). In recent cases you often see a *few* casts rather oily.

204. Sometimes you find blood, or even pus cells, entangled in the tube casts. The size of the casts varies

FIG. 23.



Drawings of casts of the tubules of the kidney. 1. Oily cast in fatty degeneration of the kidney. 2. Dark granular cast in chronic nephritis. 3. Small waxy casts. (BEALE.)

according to the part of the kidney in which they are produced, and with the state of the lining membrane of the tubes. If the epithelium be abnormally adherent, the cast will be small; if it be detached, the cast will be, of course, larger.

205. Instead of finding casts the deposit may consist of pus. You detect pus either by adding to the deposit liquor potassæ, which converts it into a thick, glairy mass, or by examination with the microscope. Pus cells are round, $\frac{1}{2000}$th to $\frac{1}{3000}$th of an inch in diameter, and have a granular appearance. When acetic acid is added they become transparent, and display

from one to four circular nuclei. If the deposit is formed of pus pass on to (219).

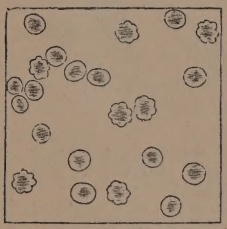
206. The deposit may consist of blood, or the urine may be coloured with blood and deposit a substance of a brownish-red colour. After remaining long in urine

FIG. 24.

Pus cells as seen under the microscope. (BOWMAN.)

blood corpuscles often have a ragged irregular outline; they are about $\frac{1}{3000}$th part of an inch, and have no nucleus. If there be blood pass on to (226).

FIG. 25.



Blood corpuscles in urine: some have an irregular outline. (BOWMAN.)

A. The urine is albuminous and contains tube casts.

207. *a.* Inquire if the disease is recent, or of long duration; if recent it is *acute tubular nephritis:* if chronic pass on to (210).

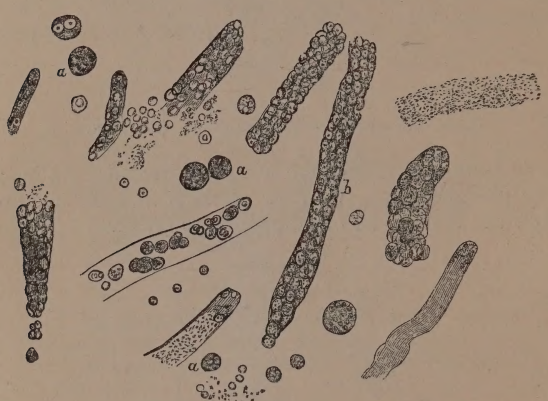
208. *a. a.* The urine is scanty, high coloured, of high

specific gravity, albuminous, sometimes bloody; the tube casts are cellular, or transparent. The patient has œdema of the body, face, and limbs, a quick pulse, thirst and dry skin.

The disease is *acute tubular nephritis.*

209. This form of disease usually arises in children from scarlatina, in adults from exposure to wet and cold. It is frequently complicated with inflammation of the pleura, pericardium, or peritoneum. The presence of

FIG. 26.



Drawing of red deposit from urine in acute tubular nephritis. *b.* Fibrinous casts covered with renal epithelium. (JONES and SIEVEKING.)

blood shows that the affection is recent and the congestion severe. Combined with the dropsy you will generally find cough and dyspnœa. Convulsions are not unfrequent. If inflammation of other organs takes place, the symptoms of such affections are of course superadded. Recovery is often ushered in by profuse diuresis.

210. *b.* The chronic diseases under this head, are, chronic tubular nephritis (large white kidney), fatty

kidney, amyloid degeneration of the kidney, intertubular nephritis (granular degeneration).

211. *a. a.* The urine is not diminished in quantity, is generally of low specific gravity and is albuminous, the tube casts are mostly granular, or transparent; there is œdema of the body and limbs, and anæmia.

The disease is *chronic tubular nephritis.*

212. In some cases you may detect enlargement of the kidney in the loins. This is most easily done whilst the patient is resting on his hands and knees, or lying on his face. This form of disease seldom occurs in persons above forty-five years of age.

213. The pallor of the skin, and the swelling of the face and limbs, will at once arrest attention, and enable you to guess at the nature of the disease before you examine the urine. The complaint is usually accompanied either by bronchitis, hydrothorax, disordered digestion, vomiting in the early morning, or diarrhœa. The patient is liable to inflammation of various organs.

214. *b. b.* If in addition to the albuminous state of the urine, and the general symptoms of disease of the kidney, you find *numerous* casts loaded with fat, or a quantity of free oil, you may diagnose *fatty degeneration of the kidneys.*

215. If with pale and very albuminous urine of low specific gravity, you find casts mostly of the large waxy form in a person who suffers from diarrhœa, or has diseased bone, or enlarged liver or spleen, or has suffered greatly from syphilis, you may suspect the disease to be *amyloid degeneration of the kidneys.*

216. *c. c.* The urine is pale, increased in quantity, of low specific gravity, and albuminous. The tube casts are mostly large and granular. The patient is thin, pallid, feeble, and suffers from dyspepsia, dyspnœa, and generally from œdema of the legs.

The disease is *intertubular nephritis* (*granular kidney*).

217. This form of disease progresses more slowly than those before described, and occurs chiefly in older

persons or in those subject to gout. As the kidney becomes less able to perform its functions other organs are implicated. Thus you will meet with affections of the retina, paralysis, hypertrophy of the heart, bronchitis, or dropsy. Early in the disease the urine may be free from albumen, but it is increased in quantity, and contains a few tube casts, the patient loses flesh and strength, and is troubled with vomiting and dyspepsia. Dropsy is much less common than in the other varieties of "Bright's disease."

218. Granular kidney is mainly distinguished from the other forms of "Bright's disease" by the paleness and increased quantity of the urine, by its low specific gravity (often below 1010), and the small amount of albumen it contains; by the disease occurring chiefly in middle-aged or old persons, and in those who have suffered or are hereditarily predisposed to gout, by the slowness of its course, the frequent absence or small amount of dropsy, and its association with hypertrophy of the heart, or cirrhosis of the liver.

B. The urine is albuminous, contains no tube casts, and deposits pus.

219. You may often find with the aid of the microscope, a few pus corpuscles in the urine of persons in perfect health, or you may see them entangled in the tube casts in cases of acute or chronic nephritis. I here allude only to such a deposit of pus as is evident to the eye of the observer.

220. The pus may result from inflammation of other parts of the genito-urinary organs than the kidneys, or from abscesses bursting into them. If the patient is a female, ascertain if she suffers from leucorrhœa, or any other affection of the uterus or vagina. In the male, the urethra, prostate, or bladder, may be in fault. Inquire if he has been affected with stricture of the urethra, or stone in the bladder, if there is frequent desire to pass urine, or difficulty in so doing, also if there is tenderness in the perineal or hypogastric regions. If you can find no evidence of disease in the

uterus, vagina, bladder, or urethra, the pus must originate in the kidney.

221. *a.* The diseases of the kidneys capable of producing pus in the urine are all chronic, and are,—dilatation of the kidney, pyelitis, and tubercle of the kidney.

222. *a. a.* Together with the deposit of pus in the urine, you can feel a fulness, or a smooth immovable tumour in the lumbar region; there is tenderness on pressure, and the patient complains of pain in the loins, thigh, and testis. There is usually debility and occasional night sweats.

The disease is *dilatation of the kidney.*

223. In stout persons, or where the dilatation is small, you may not be able to feel the enlarged kidney. This form of disease is generally produced by stricture of the urethra, stone in the kidney, tubercular disease of the kidney, and, in the female, by cancer of the uterus. When it results from stricture the diagnosis is very difficult, as the bladder is generally at the same time diseased. If the complaint has been produced by stone in the kidney, which is the most general cause, you may have a history of pain in the loins, attended by occasional attacks of hæmaturia to guide your opinion.

224. *b. b.* You find a deposit of pus in the urine of a patient who has not suffered from the causes of dilated kidney, but who presents indications of tubercular disease of the lungs.

This disease is probably *tubercle of the kidneys.*

225. This disease is comparatively rare, and probably never exists without the presence of tubercles in the lungs. The kidney may be enlarged, but it is not generally so. Sometimes hæmaturia is the earliest symptom. As tubercular disease occasionally leads to dilatation of the kidney, it is advisable to examine the state of the lungs whenever pus exists in the urine. The presence of a yellow, cheesy matter, insoluble in acetic acid, in the urine, is by many considered an indication of the presence of tubercle.

C. The urine contains albumen, but no casts, and deposits blood, or is tinged with it.

226. You must first satisfy yourself with the microscope that the colouring matter is really that of blood; it may be from beetroot, rhubarb, logwood, &c. (see fig. 25). In the female, blood is often found in the urine from affections of the uterus or vagina; in the male, from those of the prostate and bladder. When it comes from the bladder the blood is not generally diffused through the urine, but is chiefly passed towards the termination of micturition, and is apt to form clots. Having then first ascertained that there is no disease of other organs likely to produce bleeding, and remembering that in nephritis the blood is entangled in or accompanied by tube casts, inquire if the disease is recent (227), or of long duration (230). The absence of tube casts shows that the secreting portions of the kidney are unaffected.

227. *a.* The only recent diseases of the kidney likely to produce this symptom are the passage of a stone down the ureter and intermittent hæmaturia (236).

228. *a. a.* The patient suffers excruciating pain in the loin and down the direction of the ureter, with numbness of the thigh and retraction of the testis; there is no fever, but usually vomiting; the urine is passed frequently, is scanty, bloody, and albuminous.

The symptoms are probably due to the *passage of a calculus down the ureter.*

229. The pain is not always felt in the back, but sometimes in the sacrum or abdomen. It usually ceases directly the stone reaches the bladder. This disease is most likely to be confounded with colic, or with lumbago. The suddenness of the attack, the severity of the pain, and the alteration in the urine, distinguish it from the latter. You should inquire if the patient has previously experienced any similar illness.

230. *b.* The chronic diseases capable of producing hæmaturia without tube casts, are, rheumatic, typhoid,

and other fevers, purpura and scurvy, stone in the kidney, cancer of the kidney, intermittent hæmaturia.

231. I need only mention the occurrence of blood in the urine of persons affected with fevers, purpura, and scurvy, to put the student on his guard against mistaking this symptom in such cases for disease of the kidney.

232. *a. a.* The urine is bloody and albuminous after exertion, the patient suffers from severe pain in the back, hip, thigh, or testis; the pain varying in degree at different times.

The disease is probably *stone in the kidney.*

233. Stone in the kidney may give rise to dilatation of the organ (222), or the calculus may escape into the bladder. The symptoms vary according to the effects it produces. Inquire if any gravel or small calculi have been previously passed; also ascertain if the urine contains crystals of lithic or oxalic acid.

234. *b. b.* The urine almost constantly contains blood; the patient suffers from severe pain of the loins, and a liability to attacks of vomiting; he is thin, pale, sallow, and feeble; a tumour can be felt in the lumbar region.

The case is *probably cancer of the kidney.*

235. The diagnosis is generally difficult. If there is a tumour in the lumbar region, you have to distinguish between cancer and dilated kidney. The former is much more rapid in its course, and is attended with greater loss of flesh and strength; in the latter the urine usually deposits pus instead of blood. When you suspect cancer, examine the liver in order to ascertain if it is enlarged with cancerous tumours. In the later stages of cancer you often have dropsy of the legs and abdomen, and occasionally portions of cancerous structure can be detected in the urine. Remember that most of the cases of cancer of the kidney occur in persons above fifty years of age.

236. *c. c.* The patient suffers from occasional attacks of hæmaturia without apparent cause; the general health is unaffected, and the urine generally con-

tains oxalates. There is no tumour in the lumbar region.

The disease is probably *intermittent hæmaturia.*

237. In most of these cases the attacks have been attributed to cold, but many seem to be connected with gout or ague. Along with the blood there is generally a large quantity of lithic or oxalic acid crystals.

SECTION II.

You find that the Urine contains Sugar.

238. There is only one disease under this head—viz., *diabetes.*

239. In testing for sugar it is more convenient to use Dr. Pavy's solution than the liquor potassæ and sulphate of copper (198). The solution consists of sulphate of copper 320 grains, tartrate of potash (neutral) 640 grains, caustic potash 1280 grains, distilled water 20 fluid ounces. The tartrate of potash and caustic potash are to be dissolved together in one portion of the water, and the sulphate of copper alone in the other; the two solutions are then to be mixed. Add an equal bulk of this solution to the suspected urine, and boil in a test-tube, when the suboxide of copper will be deposited if sugar be present.

240. The presence of sugar in the urine may also be determined by fermentation. Mix a small portion of German yeast in the urine contained in a test-tube, close the open end of the tube with a small dish, and invert them. Pour a little more of the urine into the dish, and if any air has entered the tube, mark with ink the exact height at which the liquid stands. Set aside the tube for twenty-four hours in a warm place, and if sugar be present, gas will be given off from the urine, and will rise to the summit of the tube.

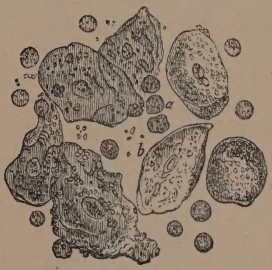
241. *a.* The urine contains sugar, it is pale, of high specific gravity (1030–1050), has a faint smell, and is passed in large quantities. The patient has lost weight

and strength, complains of great thirst, a dry skin, pains of the back and limbs; the appetite is voracious, and the bowels are usually confined.

The disease is *diabetes*.

242. You must examine the urine more than once, with an interval between the examinations, because the presence of the sugar may be only temporary, or it may have arisen from some improper article of diet. Never give an opinion as to the disease without satisfying yourself by careful chemical testing that sugar is present; for there is an excessive quantity of urine

FIG. 27.



Scales of epithelium as seen under the microscope. (BOWMAN.)

secreted in diabetes insipidus, in chronic intertubular nephritis, in hysteria, and other disorders.

SECTION III.

YOU FIND A DEPOSIT IN URINE THAT IS NOT ALBUMINOUS.

243. In perfectly healthy urine you may have a slight cloudy deposit of mucus, and on examining this with the microscope, you will generally find epithelial cells from the bladder and urethra. Those from the

bladder are flat and scaly; from the urethra they are columnar.

244. In disease of the kidneys you often have a quantity of epithelium from the renal tubes. These cells are small, round, or polygonal, and have a well-defined nucleus. The epithelial cells from the ureters and pelvis of the kidney are of the columnar form, and often adhere in small pieces.

245. In some cases spermatozoa are present. They are oval in form, with long delicate tails, and require a $\frac{1}{4}$-inch object-glass for their detection. It is only when numerous and constantly passed that they can be looked upon as indicating disease.

FIG. 28.

Different forms of uric acid crystals as seen under the microscope. (BOWMAN.)

246. In examining a urinary deposit, observe whether it is composed chiefly of crystals, or is granular and amorphous. If crystalline, begin at (247); if amorphous, pass on to (258).

A. *The deposit consists of crystals.*

247. The crystals generally met with are those of lithic acid, oxalate of lime, triple phosphate, and cystine.

248. *a.* The crystals are reddish or yellow rhombic plates (like lozenges). They are composed of *lithic acid* (*uric acid*).

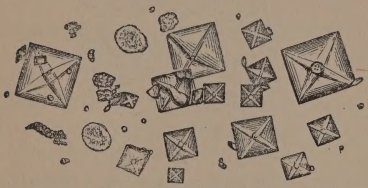
249. In case of doubt, add a drop or two of nitric acid to a little of the deposit placed upon a glass slide;

dry it over a spirit-lamp, and add to it when cold a drop of ammonia or liquor potassæ: if it is composed of lithic acid, a beautiful purple colour will be produced.

250. This deposit is generally associated with an increased acidity of the urine. It is therefore present in a number of different disorders, such as dyspepsia, rheumatism, gout, fevers, &c.

251. *b*. The crystals are octohedral, or dumb-bell

FIG. 29.



Octohedral oxalate of lime crystals. (BOWMAN.)

FIG. 30.

Dumb-bell shaped crystals of oxalate of lime. (BOWMAN.)

shaped, and of various sizes. They are composed of *oxalate of lime*.

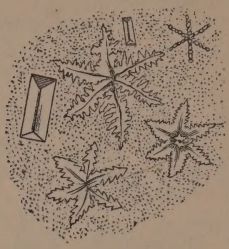
252. These crystals are insoluble in acetic acid or liquor potassæ, but dissolve in dilute nitric acid.

253. It is very common to find oxalate of lime crystals in small numbers in the urine of healthy persons, and a deposit of them may be produced by certain articles of food, such as rhubarb. When numerous and persis-

tent, they generally indicate irritability of the nervous system and feeble digestion.

254. *c.* The crystals are in the form of transparent prisms, or feathery bodies. They are composed of *triple phosphate of lime.*

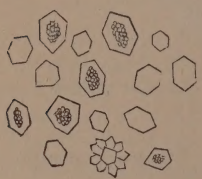
FIG. 31.



Forms of triple phosphate crystals. (BOWMAN.)

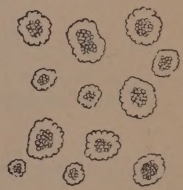
255. These crystals are soluble in acetic acid. They are associated with a neutral, or alkaline state of the urine, and may be produced by the decomposition of the urine set up by the mucus of a diseased bladder.

FIG. 32.



Crystals of cystine. (BOWMAN.)

FIG. 33.



Cystine crystallized from an ammoniacal solution. (BOWMAN.)

When there is no local cause for their production, they generally indicate a feeble state of the system.

256. *d.* The crystals are six-sided plates, very sparingly soluble in hot water, but readily so in am-

monia, and are deposited unchanged upon the spontaneous evaporation of the solution. They are composed of *cystine*.

257. The ammonia is used to distinguish cystine from lithic acid, the latter being deposited in a granular form from its solution in ammonia.

B. *The deposit is amorphous.*

258. The substances likely to form the deposit are pus, urate of soda or ammonia, and earthy phosphate. Add to the deposit in a test-tube half its bulk of liquor potassæ.

259. *a*. Pus is distinguished by the microscope (fig. 24), and forms a glairy mass when shaken with liquor potassæ.

260. *b*. The deposit dissolves in liquor potassæ. It is formed of *urate of soda or ammonia*.

261. *c*. The deposit does not dissolve in liquor potassæ. It is formed of *earthy phosphate*.

CHAPTER VI.

DISEASES OF THE LIVER.

262. The principal diseases to which this organ is liable are,—congestion, acute hepatitis, abscess, acute yellow atrophy, cirrhosis, hydatid tumours, and fatty, amyloid, and cancerous degenerations. In addition to these, we have to consider inflammation of the hepatic ducts, dilatation of the gall-bladder, and biliary calculi.

263. Congestion of the Liver.—The whole organ is enlarged, smooth on the surface, of a dark-red colour, its anterior margin hard and prominent; if cut into, blood flows freely from the section. When congestion has been maintained for some time, "nutmeg liver" is produced. In this state the liver presents, on section, the appearance of a nutmeg—viz., red spots or patches, surrounded by spaces of a yellowish or dirty-white colour. Microscopically, the hepatic cells in the interior of the lobules are often reduced in size, and are of a dark yellow colour; whilst those on the exterior are large, pale, and fatty. The most common cause of congestion of the liver is diseased mitral valve of the heart.

264. Acute Hepatitis, or acute inflammation of the liver, although rare in this country, is not uncommon in tropical countries; the only form in which you are likely to meet with it is abscess. Abscess usually presents itself either in connexion with disease of the colon, or as the result of pyæmia. In the former, the pus may be surrounded by an uneven, ragged boundary of softened hepatic tissue, or it may be enclosed by a thick, tough membrane. In the latter form a number of small abscesses occur in the course of the portal veins.

A single hepatic abscess generally presents itself in the right lobe. It may point externally or burst into the peritoneum, into the chest, or into some part of the intestinal canal; or the pus may dry up, and leave a cheesy mass of white, dry matter.

265. In Acute Yellow Atrophy the liver is much reduced in size, it is of a greenish-yellow colour, and is soft and flaccid in texture. Microscopically, the hepatic cells cannot be distinguished, but the whole structure seems to be composed of a confused mass of pigment, granular matters, and oil-globules. Crystals of tyrosine and leucine are found both in the liver and in the urine.

266. Cirrhosis, or Chronic Hepatitis.—The liver is generally much reduced in size, especially the left lobe, which is often shrivelled into a mere membranous appendage. The capsule is opaque and closely adherent, and when torn away, shows the surface of the organ to be covered with protuberances of different sizes ("hob-nail liver"). Microscopically, the main portion of the structure is composed of connective tissue, the cells are atrophied or fatty, the smaller divisions of the portal vein are compressed. In the early stage of the disease the liver is usually enlarged; it is also enlarged when cirrhosis is combined with fatty or amyloid degeneration. From the compression exercised on the portal circulation, effusion of fluid takes place into the cavity of the peritoneum (ascites).

267. Hydatid Cysts occur more frequently in the liver than in any other organ, and often attain an enormous size. The whole liver appears enlarged; the increase in size is not uniform, however, but is near the part affected by the cyst. The structure of the organ is healthy. The cyst is surrounded by an envelope of condensed areolar tissue, and contains a clear fluid, and usually other smaller cysts. Attached to and growing from the lining membrane of the cyst are minute bodies, which, on microscopic examination, are seen to be oval in shape, and to possess a head sur-

rounded by a crown of minute calcareous hooks. In some cases the hydatid dies and is converted into a putty-like mass, which you can distinguish from the remains of an abscess by finding amongst its contents the hooks of the "echinococci," as these minute animals are named. Hydatids are developed from the ova of the tapeworm.

268. The FATTY LIVER is uniformly enlarged, and has round edges, it is pale in colour, and soft in texture. Microscopically, the hepatic cells are filled with oil, and their nuclei are obscured, or have disappeared. The disease is generally found in connexion with phthisis, or some other wasting disorder.

269. AMYLOID, ALBUMINOID, or WAXY DEGENERATION OF THE LIVER.—The whole organ is uniformly enlarged, it is very heavy, firm, smooth, and pale on the surface. A section is dry and bloodless, and has a transparent appearance. A solution of iodine gives a reddish-brown colour to the tissue. The disease is sometimes associated with fatty degeneration, and it generally occurs along with a similar condition of the spleen or kidneys in persons who have suffered from affections of the bones, syphilis, or phthisis.

270. CANCER OF THE LIVER is rare as a primary affection, but is frequently met with as the result of malignant disease in other organs. In *encephaloid* cancer the liver is usually much enlarged by morbid growths from the parts affected. In *scirrhus*, hard, slightly projecting nodules are scattered through the organ. *Colloid* cancer is very rare, and seems only to occur as an extension of disease from the peritoneum. Cancer of the liver usually produces ascites, and very frequently gives rise to jaundice, by compression of the bile-ducts.

271. The GALL-DUCTS and GALL-BLADDER are liable to inflammation and malignant disease, and thus we meet with thickening, ulceration, and other morbid changes in them. If the free passage of the bile has been prevented, the gall-bladder becomes distended, and may attain a considerable size. Gall-stones are often

found in the gall-bladder after death; they are chiefly composed of cholesterine, bile-pigment, and earthy matters.

272. The symptoms that should lead you to suspect an affection of the liver, are—pain, or a feeling of weight in the epigastrium, right side or shoulder, pale-coloured stools, jaundice, vomiting, flatulence, dropsy either of the legs or abdomen, or hæmorrhage from the stomach or bowels. You should also always examine the state of this organ in cases of disease of the heart and kidneys.

273. You ascertain the size and shape of the liver by percussion, auscultatory-percussion, and by palpation. Trace the upper border first, and mark the outlines with ink, beginning where the sound is clear, and continuing downwards until you bring out a dull note. You will remark that before you find the sound *quite dull* there is a portion where, from the upper edge of the liver being covered by a thin layer of lung, the sound is more resonant than that just below it.

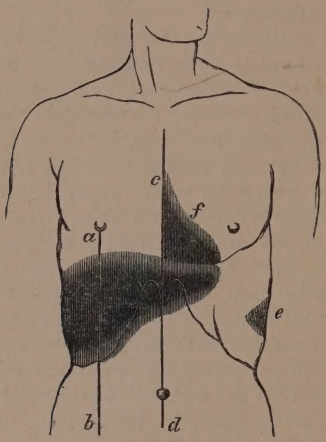
274. Both borders of the liver are curved; the upper partially dull line extends from the tenth or eleventh dorsal vertebra behind to the seventh intercostal space on a line with the centre of the axilla, and to the fifth intercostal space on a line with the right nipple, from which the dulness is prolonged to the apex of the heart. The lower border corresponds below the right nipple, with the lower margin of the ribs; in the epigastrium it generally extends two or three inches below the junction of the sternum with the lowest costal cartilage. To define the upper border percuss strongly; at the lower press the finger or plexímeter firmly down and strike lightly. You will often find auscultatory-percussion of great use in defining the lower border. Whenever the liver is diseased ascertain also the dimensions of the spleen.

275. You will gain valuable information by feeling the liver when it is enlarged. Place the patient on the left side, with both knees bent, and the back

supported by a pillow. Slide the tips of your fingers or the edge of your hand from below upwards beneath the lower edge of the liver, and instruct the patient to draw a full breath. In this way you will be able to examine both the inner and outer surfaces of the organ, and to detect any projections or irregularities that may be present.

276. Jaundice often accompanies disease of the liver,

FIG. 34.



Area of hepatic dulness, viewed anteriorly. *a—b.* Right mammary line. *c—d.* Median line. *e.* Splenic dulness. *f.* Cardiac dulness. (MURCHISON.)

and is produced by the presence of bile-pigment in the blood. The yellowness is seen in the skin, conjunctivæ, and urine. As the urine, however, may be coloured by other substances, you should test for the presence of bile with nitric acid. Pour a little of the urine on a white plate, and drop into it a drop or two of nitric acid; if bile-pigment be present a play of colours will occur round the acid,—brown, green, violet, red, and yellow.

Jaundice may be produced either by closure of the common gall-duct, or by an altered action of the liver; in the former case the stools are white, in the latter the colouring usually remains unaltered.

277. First inquire if the disease has begun suddenly or gradually. If suddenly, begin at (278); if the appearance of the symptoms has been gradual pass on to (291).

SECTION I.

The Disease has commenced Suddenly.

278. Under this head you have acute congestion, abscess of the liver, jaundice—from obstruction of the common gall-duct—and acute atrophy of the liver. In the three first the area of hepatic dulness is generally increased, in acute atrophy it is diminished.

279. *a.* You find the liver increased in size, a little tender, and smooth on its surface. There is pain, or weight in the right side, slight jaundice, nausea, or vomiting, the tongue is foul, there is loss of appetite, and the bowels are usually confined; there is no fever.

The disease is *acute congestion of the liver.*

280. This affection is often the result of disease of the heart, but may be also produced by blows on the side, malaria, and the abuse of alcoholic stimulants. It not unfrequently precedes or accompanies cirrhosis, and other disorders of the liver.

281. *b.* In addition to the signs of acute congestion, you find considerable pain and tenderness on pressure over the liver, vomiting often urgent, rigors, profuse sweats during sleep, thirst, quick pulse, and emaciation.

The disease is probably *abscess of the liver.*

282. Abscess of the liver occurs either singly as the result of acute inflammation, or as the consequence of pyæmia, when there are generally numerous deposits of pus. The former in this country is rarely met with, excepting in those who have lived in the tropics.

When a single abscess is present you may have bulging, tenderness, and obscure fluctuation over some portion of the liver, but in other cases you have no physical signs, and the symptoms may be absent or so obscure that you can only guess at the nature of the disease. The pyæmic form usually results from external injuries and surgical operations, or from some internal abscess or ulceration. It may arise from ulcers of the stomach, intestines, or pancreas.

283. *c.* You find yellowness of the skin, conjunctivæ, and urine, the stools are pale, the heat of skin is not increased, the pulse is not quick, and there are no head symptoms; there is increased dulness over the site of the gall-bladder. The disease is *jaundice from obstruction of the common gall-duct.*

284. This form of jaundice may arise from the duct being closed by a gall-stone, by inflammation of the duct itself, or by tumours pressing upon it. Consequently the jaundice may be temporary, or permanent, and it may occur during the progress of other hepatic diseases. The liver is often uniformly enlarged from the congestion of the bile-ducts; its surface is smooth.

285. When the jaundice arises from a gall-stone it is preceded by severe, dull pain, aggravated in paroxysms, referred to the gall-bladder or right scapula. During the paroxysms the face is pale, the pulse slow, the face covered with sweat; the pain is not increased by pressure; vomiting of an acid fluid often takes place. The pain generally terminates suddenly, and jaundice occurs a day or two afterwards. In such cases the stools should be well mixed with water and strained through muslin, so that any calculus that may have been passed may be discovered. Gall-stones are most common in persons of middle, or advanced age, and are more frequent in females.

286. If the closure of the gall-duct has arisen from inflammation extending from the stomach and duodenum, the jaundice is preceded by tenderness of the

epigastrium, bilious vomiting or diarrhœa, white tongue, and loss of appetite. When repeated attacks of jaundice, unaccompanied by other disease of the liver, occur in a young person, they usually depend on inflammation of the ducts; when in one of middle or advanced age, on the irritation excited by gall-stones.

287. In some cases the gall-bladder, from long distension, forms a pear-shaped tumour extending downwards. It is most likely to be mistaken for a hydatid tumour, but its situation, the presence of jaundice, and the probable history of gall-stones, cancer, or other disease of the liver will serve to distinguish it.

288. *d.* You have jaundice *attended with diminution of the area of hepatic dulness*, pain in the epigastrium, vomiting, often of blood, restlessness and delirium or coma, rapid pulse, thirst, dry brown tongue, and hæmorrhages from the stomach, bowels, or uterus. The urine generally contains leucine and tyrosine.

The disease is *acute yellow atrophy of the liver.*

289. The complaint is generally ushered in with headache, nausea, vomiting, foul tongue, and rapid pulse. It is usually fatal, and is most common during pregnancy. It ordinarily runs its course within a week.

290. Tyrosine and leucine are found by evaporating the urine, when, if present, they form crystals, which can be detected by the microscope. Tyrosine forms needle-shaped crystals, arranged in bundles or stellate groups; leucine occurs in "laminated crystalline masses."

SECTION II.

The Disease has commenced gradually.

291. First ascertain if the area of dulness of the liver is increased or diminished. If enlarged begin at (292); if it is smaller than in its normal state, or is attended with dropsy, pass on to (306). In all cases examine and mark out the size of the spleen.

A. *The liver is increased in size.*

292. In this case, ascertain whether there be pain and tenderness on pressure, if so, pass on to (301); but if there is neither pain nor tenderness, begin at (294).

293. I must caution you against certain errors to which you may be liable in estimating the size of the liver. Sometimes its lower edge is ill-defined from impaction of fæces in the colon. Auscultatory-percussion will usually prevent your making a mistake in this particular; but if you have any doubt, the colon should be emptied by an enema or purgative. Or the liver may be pushed downwards by pleurisy, emphysema, or distended pericardium or by the use of tight stays or belts. To diagnose pleurisy with effusion from enlarged liver, remember that the upper border of the dulness in pleurisy is plane, not arched, and that the liver is not pushed downwards on forced inspiration. Where tight-lacing has been practised, you will generally find some external evidence of it.

a. You find the liver increased in size, but there is neither pain nor tenderness on pressure.

294. Under this head you have fatty liver, albuminoid or waxy liver, and hydatid tumour. In the two first the enlargement is *uniform*, in the third it is irregular in shape.

295. *a. a.* There is no pain in the hypochondrium or epigastrium, the liver is *uniformly* enlarged, feels smooth and rather soft, but is not tender on pressure; the spleen is not enlarged; there is neither jaundice, dropsy, nor albumen in the urine; the patient is usually feeble and liable to diarrhœa.

The disease is probably *fatty liver.*

296. This affection most commonly occurs in persons labouring under phthisis, in drunkards, in patients who have suffered much from syphilis or other exhausting diseases. Perhaps its chief characteristic is the absence of all symptoms leading to suspicion of hepatic disorder.

297. *b. b.* There is only a feeling of fulness in the hypochondrium, the liver is *uniformly* enlarged, it feels hard and smooth, but is not tender on pressure; the spleen is enlarged, jaundice is rare, but dropsy of the abdomen is sometimes present; the urine is copious and often contains albumen; the patient is pale and anæmic, and is liable to nausea, vomiting, and diarrhœa.

The disease is probably *amyloid degeneration of the liver.*

298. This malady generally occurs in persons who have suffered greatly from syphilis, disease of the bones, or phthisis, or in those who have had long-continued suppuration from other causes. The condition of the spleen and urine are the most important points in the diagnosis; and it should be remembered that the amyloid attains a greater volume than the fatty liver. In some syphilitic subjects the shape of the enlarged liver is not quite uniform, being divided by one or more deep cicatrices.

299. *c. c.* There is no pain or tenderness on pressure, but the liver is enlarged, *not uniformly,* but presents a swelling or tumour at some part of its area. The tumour is smooth, elastic, and sometimes gives a peculiar vibration to the fingers on percussion. There is no enlargement of the spleen, jaundice, nor dropsy, and the patient's general health is unaffected.

The disease is probably *hydatid tumour of the liver.*

300. If not relieved by treatment, the tumour may cause death by bursting through the diaphragm, or into the peritoneal cavity, or it may evacuate its contents through the gall-ducts or some part of the intestinal canal. It may be confounded with abscess of the liver, enlarged gall-bladder, or cancerous tumour. The absence of constitutional symptoms distinguishes it from abscess; the jaundice, site of the tumour, and perhaps a history of previous colic, serve to diagnose the enlarged gall-bladder; whilst malignant disease will be recognised by the irregularity of the surface of the tumour, the pain and tenderness, and the rapid loss of

flesh and strength that accompany it, and often by the presence of cancer in some other organ of the body.

b. You find a chronic enlargement of the liver, attended with pain in the hypochondrium or epigastrium, and tenderness on pressure.

301. Under this head are chronic congestion, abscess, cancer, and cirrhosis, if attended with fatty or amyloid degeneration (306). You may meet with jaundice in all of these, and, with the exception of chronic congestion, the outline of the organ is in all apt to be *irregular*. In the two latter you may have dropsy.

302. Chronic congestion presents the same symptoms as when it is acute (279), but they are generally less severe; it results from diseased heart, malaria, or the abuse of ardent spirits. Although the onset of acute hepatitis begins suddenly (281), yet an abscess produced by it may remain for a length of time. In such a case you will find enlargement, with irregularity in the shape of the liver, and pain and tenderness on pressure; but besides the history of the disease, your diagnosis will be assisted by the presence of fever, rigors, sweatings, and emaciation.

303. *a. a.* There is severe pain in the hypochondrium or epigastrium, with tenderness on pressure. The liver is enlarged, its shape is irregular, and the edge or the surface is uneven; the spleen is seldom enlarged, but jaundice and dropsy are usually present. The patient is sallow, feeble, and emaciated.

The disease is *cancer of the liver.*

304. In three-fourths of the cases there is also a cancerous tumour of some other organ, usually of the breast, uterus, or stomach, and the glands of the neck are often affected. It rarely occurs below forty years of age, and the patient usually dies within twelve months. The jaundice, when present, is commonly produced by the pressure of enlarged glands upon the common bile-duct.

305. Cancer of the liver is most liable to be mis-

taken for amyloid disease, hydatids, or cirrhosis. In amyloid degeneration the progress is slow, there is no pain nor tenderness, the spleen and kidney are generally affected, and there is a history of caries of the bones, constitutional syphilis, or long-continued suppuration. When the cancer is of the fungoid character, it may be confounded with hydatid tumour, but the smoothness of the surface, and the absence of pain and constitutional symptoms will enable you to diagnose the latter affection. The enlarged stage of cirrhosis will be recognised by the smaller amount of pain, the slowness of the progress, the absence of other malignant tumours, and the history of tippling. When jaundice arises from malignant disease, the colour of the skin is frequently of a very deep yellow, tending to a greenish brown.

B. *The liver is diminished in size.*

306. Before concluding that the liver is diminished, you must bear in mind the possibility of mistakes through the following conditions:—The stomach and colon may be so much distended that you are unable to mark out the lower edge of the liver, or a portion of intestine may lie across and conceal it. If the lower border is very thin, and you percuss strongly, the resonance of a portion of gut below it may deceive you as to its actual size. Again, in some cases the front of the liver is puckered up by cicatrices, whilst the posterior part is enlarged. In all doubtful cases you should lay the patient on his face, and mark out the organ from behind, as well as laterally and in front.

307. *a.* The area of hepatic dulness is diminished, especially over the smaller lobe; if the lower border can be distinguished, it feels rough and irregular. There is usually ascites, and the superficial veins of the abdomen are enlarged. The patient is dyspeptic, sallow, and much emaciated; hæmorrhages are apt to occur from the stomach and bowels.

The disease is *cirrhosis.*

308. In the earlier stages the size of the liver is

often increased, and its uneven surface can be felt below the ribs; there is pain in the hypochondrium, feverishness, loss of appetite, flatulence, pain after food and irregularity of the bowels. The disease occurs almost entirely amongst spirit-drinkers.

309. There is a form of atrophy of the liver which sometimes follows the chronic congestion produced by diseased heart; and another variety results from chronic peritonitis. The symptoms in both are similar to those of cirrhosis; but they differ from it in their not being the effects of ardent spirits.

CHAPTER VII.

DISEASES OF THE STOMACH.

310. The principal diseases of the stomach are—congestion, acute, sub-acute, and chronic gastritis, ulceration and dilatation, and fatty, amyloid, and cancerous degenerations of this organ.

311. If digestion has been in progress at the time of death, the mucous membrane will be found partially, or wholly, digested by the gastric juice. You must be careful not to mistake the changes thus produced for those of disease.

312. When Post-mortem Solution has taken place, the mucous membrane is smooth, very thin, more translucent than usual, softened, or entirely dissolved, so that the subjacent muscular coat is left bare; the veins are filled with black blood, and their contents can be easily squeezed out. The splenic region is most generally affected, and a well-defined irregular line often shows the height to which the digestive fluids have reached. Sometimes only the summits of the rugæ are softened, but in other cases the whole of the coats are dissolved, and the contents of the stomach may be found in the peritoneal cavity, or even in the left pleura. The extreme degrees of softening are most common in children, in persons dying of brain diseases, or in those in whom death has taken place whilst digestion was in progress.

313. Congestion of the Stomach.—The mucous membrane is covered with a tenacious layer of mucus, it is thickened, is of a deep red, almost purple, colour; its rugæ are very prominent, and the vessels seem enlarged and full of blood. Small, round, dark-coloured

spots present themselves, chiefly in the pyloric region. Microscopically, the smaller vessels are much congested, the coats of the veins often thickened; the contents of the tubes are composed only of gastric cells. The effect of congestion is to lessen the amount of gastric juice secreted, and thus to impair digestion. It is generally the consequence of disease of the heart, liver, or lungs.

314. Sub-acute Gastritis, or sub-acute inflammation of the mucous membrane of the stomach, is much more common than acute gastritis, which is rarely met with excepting as the result of irritant poisons. In sub-acute gastritis the stomach is small and contracted, the morbid appearances are those of congestion, often attended by superficial ulcerations. Microscopically, the bloodvessels are injected, the gastric tubes are filled with cells, granular and fatty matters, and in some cases with blood. The disease is generally met with in persons affected with anæmia, or in those suffering from disease of the kidneys or heart.

315. Chronic Gastritis occurs under different forms. When present in an extreme degree the whole organ is small, globular in shape, very much thickened, and does not collapse when cut open; but this form of thickening is usually limited to the pyloric region. When the mucous membrane is alone affected with chronic inflammation, it is of a slate-grey or dark colour, uneven on the surface, as if warty, thickened, and dense. Microscopically, the gastric tubes are at first firmly united together, the bloodvessels are enlarged and often thickened; at a later stage the tubes are replaced by a fibroid tissue, or are only represented by irregular lines of cells. The solitary glands are generally enlarged and filled with nuclei and cells, and the gastric tubes seem frequently to be atrophied by the pressure of these bodies.

316. Ulceration of the Stomach presents itself under different forms. 1. As *superficial erosions*, resulting from the round, dark spots that so often accompany

congestion and subacute gastritis. 2. The *perforating ulcer*. You meet with a circular ulcer penetrating through one or more of the coats of the stomach, the edges as cleanly cut as if they had been punched out; the size of the sore decreases as it proceeds outwards, so that if it has passed through the peritoneum, the perforation of that membrane may be a mere pinhole or chink. This kind of ulcer is chiefly met with in young persons, and may give rise to fatal peritonitis by perforation. 3. The *chronic gastric ulcer*. In this the edges are generally raised, and the surrounding structures are hard and condensed; the surface is formed by the coats not perforated, or by some other organ, such as the liver or pancreas, to which adhesions have extended. It varies greatly in size, and is most common in the smaller curvature near the pylorus. 4. *Sloughing ulcers* are occasionally found in persons much reduced by syphilis, or diseased kidneys, and who have during life presented no symptoms of gastric affection.

317. Ulcers of the stomach may heal, and if of large size, their cicatrices may contract and greatly distort the shape of the organ, and thus give rise to dilatation. They may produce death by exhaustion; by hæmorrhage through laying open a large bloodvessel; or by peritonitis set up by perforation of the peritoneum.

318. Fatty degeneration of the Stomach is a common affection; the mucous membrane is pale, soft, and easily torn. Microscopically, the gastric tubes are filled with large, fatty, and granular gastric cells; the basement membrane is thin and very transparent; at a later stage the whole structure seems to be composed of fat. This degenerative condition often accompanies cancer, phthisis, and other wasting disorders.

319. Amyloid or Waxy Degeneration is usually associated with a similar condition of the liver, spleen, and kidneys. It is recognised by the brownish-red tint given to the tissues by a weak solution of iodine. The smaller arteries are generally thickened.

320. In Dilatation of the Stomach the organ is greatly enlarged, sometimes so much so as to fill the whole abdominal cavity; its coats are thin, and when examined with the microscope, the gastric tubes are often found widely separated from each other, and in a state of fatty degeneration. Dilatation is usually produced by an obstruction at the pylorus, preventing the free evacuation of the contents of the organ. This may arise from fibroid or muscular thickening, from the cicatrix of an ulcer, or from enlarged glands or other tumours compressing the orifice of the stomach.

321. Cancer of the Stomach is frequently met with, chiefly at the pyloric or cardiac orifice, or at the lesser curvature; all the varieties of malignant disease present themselves. *Scirrhus* is most common at the pylorus. It forms a hard tumour encircling and constricting the opening into the duodenum. When a section is made, the mucous membrane is generally found to be ulcerated, and the tumour presents a fibrous appearance, traversed by bands. Microscopically, the mucous membrane of the whole organ is in a state of atrophy, or of fibroid degeneration; the tumour consists of caudate cells intermixed with fibres. *Encephaloid cancer* is most frequent at the cardiac orifice; it forms a soft, fungoid, vascular tumour, which on microscopic examination proves to be composed of nucleated cells, varying greatly both in size and shape. *Colloid cancer.* When a section is made of this the tumour is seen to contain a number of small cavities, filled with a jelly-like material, and surrounded by fibrous tissue. The jelly, under the microscope, appears to contain cells of various shapes and sizes. *Villous cancer.* In this you find the mucous membrane covered with long, soft projections like intestinal villi, which, when examined microscopically, are seen to be composed of cells and soft fibres. You not unfrequently meet with two of these forms of malignant disease associated together; thus a tumour may be scirrhus with a soft encephaloid projection.

Cancer of the stomach is very liable to affect the neighbouring glands, the liver, pancreas, and peritoneum. Adhesions are usually formed to the surrounding structures, even when the malignant action has not extended to them. When the cardiac orifice is obstructed the stomach is reduced in size, on account of the small amount of food that enters it. When the pylorus is constricted, the whole organ enlarges from the food being retained for a length of time.

322. The stomach sympathises with almost every organ, and you will consequently find it frequently in an abnormal condition. The symptoms that should direct your attention to it are,—pains or uneasiness in the epigastrium or in the left or right hypochondrium, loss of appetite, nausea, vomiting, waterbrash, eructations, or excessive flatulence.

323. The tongue affords most valuable indications of the condition of the gastro-intestinal tract, and also of the system at large. The chief points of which you must take notice are its size, and colour, whether it is moist or dry, and the amount of epithelium or "coating" covering it. It is large, flabby, or indented with the teeth at its sides, in persons suffering from general debility, and in many chronic affections of the digestion; in cases of subacute gastritis it is often small and sharp at its extremity. Paleness is associated with general anæmia; redness of its surface, tip, edges, or papillæ, usually accompanies subacute or chronic gastritis. When the tongue is covered with a thick fur, there is generally also a similar condition of the mucous membrane of the stomach; where, as in scarlatina, it looks raw, the other parts of the gastro-intestinal tract are also affected. Always remember, however, that the abnormal appearances of the tongue may be produced by local causes, such as inflammation of the throat or gums, or by the habit of sleeping with the mouth open. In cancer and ulcer of the stomach the tongue seldom presents any characteristic appearances.

324. You may employ the following means of physical diagnosis to ascertain the state of the stomach :— palpation, percussion, auscultatory-percussion, and the microscopic examination of the vomited matters, stools, and urine.

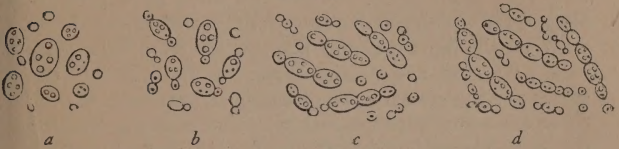
325. You make pressure in order to find if there is any tenderness in the region of the stomach; the sense of touch is employed to discover if a tumour is presen. Tenderness is best ascertained by pressure with the tips of the finger successively applied to each portion of the epigastrium. Often the patient, especially if a female, will shrink from nervousness when the whole hand is applied to the region of the stomach; in such cases conduct your examination whilst her attention is diverted by conversation. A tumour is most readily felt when the patient lies upon the back, with the head and knees well raised. Always observe the shape and consistence of a tumour, whether it is fixed or moveable, if it is tender to the touch, and if it pulsates.

326. In estimating the size of the stomach, first percuss the lower edge of the liver, and the right side of the spleen (421). The clear sound of the stomach is heard between these organs; it is distinguished from the colon by the more amphoric character of the sound elicited by percussion. Auscultatory-percussion of the middle and pyloric regions is practised by placing the patient on his left side, and applying the stethoscope to a spot in the epigastrium, where you have previously ascertained by percussion that a clear sound exists; you then mark with a pen the point at which the impulse of the stroke of the finger ceases to be conveyed to the ear with equal force; next, let the patient turn to the opposite side, and in a similar manner mark out the larger end of the stomach. In all doubtful cases examine both when the organ is full and empty; and you will often find it an advantage to have the bowels previously emptied by a purgative or an enema.

327. You examine vomited matters with the microscope for the purpose of detecting fungi or any casts or

particles of mucous membrane that may have been thrown off from the surface of the stomach. In the former case, remove a small quantity of the vomited matters with a dipping-tube, place it on a slide, and add a drop of weak solution of iodine. The iodine makes

FIG. 35.

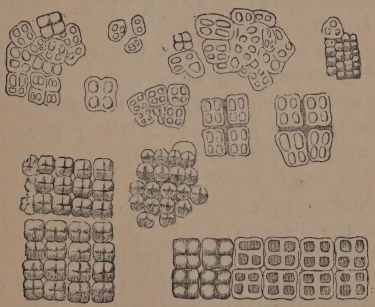


Torula Cerevisiæ, or Yeast-plant, as developed during the process of fermentation :—*a*, *b*, *c*, *d*, successive stages of cell-multiplication. (CARPENTER.)

any starch that may be present of a blue colour, whilst it turns fungi brown. The principal forms of fungi you will meet with are torulæ and sarcinæ.

328. Torulæ appear like round or oval vesicles, many of which present little buds projecting from

FIG. 36.



Sarcina ventriculi. (CARPENTER.)

them, or in a later stage of development, they unite so as to form chains. They appear very rapidly whenever fermentation has arisen in the contents of the stomach.

329. Sarcinæ are oblong or square bodies, divided into similar small cells by lines crossing each other at right angles; they are most frequently found in cases of obstruction of the pylorus or duodenum.

330. You can only distinguish casts or pieces of mucous membrane when the fluids vomited are clear and free from food. Place the fluid in a conical-shaped glass, and remove any particles that may subside with a dipping-tube, and place them in a thin glass cell. "Casts" are of the shape of the pits on the surface of the stomach, or of the gastric tubes; two or three are often joined together. You may mistake for them the sarcolemma of digested muscular fibres, but the latter are distinguished by their being transparent, and often containing a few globules of fat. Particles of mucous membrane thrown off by ulceration are usually stained with blood, and exhibit the characteristic openings of the gastric tubes. You may mistake particles of bread, which also present little cavities, for them; but the holes are irregular in size and shape, and on crushing them, it will be seen that they are not of animal origin.

331. The examination of the urine in cases of disorders of the digestion is very important; for instance, in diabetes the patient frequently complains more of disordered digestion than of an increase in the amount of the urine. Ascertain if there is any albumen, take the specific gravity, and note if there is any deposit, and if so, what is its nature (243).

332. The appearance of the stools often supplies important evidence of abnormal states of the digestion. Sometimes the imperfect solution of the albuminous materials of the food is shown by lumps of undissolved muscular fibres; at other times (chiefly in children) the evacuations consist of masses of unaltered starch. A pitchy appearance of the motions, proving the presence of blood, often assists in the diagnosis of gastric ulceration and cancer.

333. Commence your inquiries by ascertaining

whether the complaint has commenced suddenly, or gradually; if suddenly, begin at (334), if gradually, pass on to (339).

SECTION I.

Acute Diseases of the Stomach.

334. Under this head you have only "bilious vomiting" and "subacute gastritis." Both of these affections are usually accompanied by vomiting; but as this is also present in diseases of the brain, you will often find it difficult to determine which organ is in fault. Remember that in gastric vomiting there is generally some tenderness of the epigastrium, nausea, or a sense of weight at the stomach; none of which occur in head attacks. In disorders of the digestion the tongue is loaded, and the bowels sometimes purged; in those of the brain the tongue is generally clean, and the bowels obstinately confined; in the former, the headache is less persistent and intense, and giddiness, if present, is relieved by the vomiting; in the latter, various other symptoms, such as indistinctness of vision, loss of memory, convulsions, &c., are apt to supervene.

335. *a.* The patient is subject to attacks of vomiting of bile, mucus, or acid. There are generally present—headache, a foul tongue, loss of appetite, thirst, confined bowels, urine scanty and loaded with lithates. The pulse is seldom quickened, and the heat of the skin is not increased.

The disease is a "*bilious attack.*"

336. The illness is often preceded by drowsiness and the frequent passing of pale urine. In the intervals between the attacks there are generally symptoms of chronic gastritis. If the vomiting should last longer than twenty-four hours, examine the fluids rejected from the stomach for torulæ, the presence of which in some cases keeps up the irritation of the mucous membrane.

337. *b.* The patient suffers from constant vomiting,

pain, or uneasiness, and also tenderness at the epigastrium; the tongue is red or coated; complete loss of appetite with thirst, is also present. The pulse is quick, and feeble, and there is great depression of strength.

The disease is *subacute gastritis*.

338. The fluid vomited is composed chiefly of mucus, often streaked with blood; in some cases casts of the gastric tubes or even particles of the mucous membrane can be recognised with the microscope. The severe forms occur most frequently in persons who have long suffered from diseases of the heart, kidneys, liver, or uterus, and often end fatally. A less dangerous variety occurs in rheumatism, gout, and in young females in whom the catamenial functions are disordered. Subacute gastritis may persist for many months, especially in young persons, and vomiting of food may be the most prominent symptom.

SECTION II.

Chronic Disorders of the Stomach.

339. Ascertain if there is pain in the region of the stomach, commencing or aggravated shortly after food, and if there is tenderness of the epigastrium. If neither of these symptoms are present, begin at (340); if they are present pass on to (344). If the stomach is found by percussion to be much enlarged, pass on to (351).

A. Pain is either absent, or, if present, it does not commence nor is it aggravated shortly after food, and there is no epigastric tenderness.

340. Under this head you have atonic dyspepsia and gastric neuralgia.

341. *a.* The patient complains of weight, tightness, or a feeling of discomfort during digestion. The tongue is large, flabby, or indented at the sides, often thinly furred; bad appetite, flatulence, coldness of the

extremities, depression of spirits, feeble pulse and often confined bowels are also present.

The complaint is *atonic dyspepsia.*

342. The pain is seldom severe; it may be caused by flatulence, and relief is obtained when air escapes from the stomach; or it may take place when the stomach is nearly empty, and it is then relieved by food and stimulants; or again it precedes the rejection of a thin tasteless fluid ("waterbrash"). There is frequently great nervousness, irresolution, or mental depression. The urine often deposits oxalates or triple phosphates. The complaint is common in the old, and in feeble persons, and it is often produced by insufficient food, anæmia, leucorrhœa, the excessive use of tea, and other causes tending to produce debility.

343. *Neuralgia*, unaccompanied by organic affection of the stomach, is a rare disease. The pain is very severe, usually periodical, and the disorder seems in most cases to have resulted from malaria. The diagnosis is mainly determined by the character of the pain and our inability to discover any definite cause to which it can be attributed.

B. Pain is increased shortly after food, and there is tenderness on pressure in the epigastrium.

344. You may have under this head, chronic gastritis, ulceration, cancer.

345. *a.* You find a dull pain or oppression shortly after food, sometimes vomiting of acid or mucus. The tongue is coated, or red at the tip or edges. The patient is liable to acid eructations or heartburn, flatulence, thirst, burning of the hands or feet. The bowels are usually confined, and the urine high coloured, depositing lithates, lithic acid, or oxalate of lime.

The disease is *chronic gastritis.*

346. The symptoms vary greatly in degree. In some cases the pain is severe, in others scarcely felt; sometimes there is considerable tenderness, at others but little. In all probability, where the pain and tenderness are slight but the tongue is foul, and the thirst,

acidity, and flatulence are well marked, the complaint is rather congestion than inflammation of the mucous membrane. You must remember that when the patient recovers from gastritis the stomach still remains for a time incapable of efficiently performing its functions, and thus many cases are followed by atonic dyspepsia. Chronic gastritis usually accompanies affections of the heart, liver, and kidneys, and is common in drunkards.

347. *b.* There is fixed and severe, sharp or cutting pain localized in the epigastrium, back, or hypochondrium, produced or aggravated very shortly after food; tenderness on pressure of the epigastrium, and vomiting of food with relief to the pain. Blood is sometimes rejected from the stomach, or the stools are of a pitchy character. The patient is emaciated, the pulse feeble, the skin cool, the bowels usually confined.

The disease is probably *ulceration of the stomach.*

348. In the early stage the pain is only a feeling of tightness after food, but it increases gradually until it becomes a severe, wearing, or burning sensation. It is sometimes relieved by position; thus lying on the back gives relief if the ulcer is on the anterior part of the stomach, or leaning over a chair alleviates the suffering produced by one on the posterior surface. Vomiting of blood occurs in diseases of the heart and liver, but if hæmatemesis takes place where these are absent, and is accompanied by the other symptoms of ulceration, it renders the diagnosis almost certain. Ulceration often occurs in young persons, and the symptoms are sometimes very obscure; in old or middle age, its duration is generally long, and the indications well marked. It may destroy life by exhaustion, hæmorrhage, or perforation and consequent peritonitis. If the ulcer heals it may produce contraction of the pylorus, and dilatation of the stomach.

349. *c.* There is severe lancinating pain, and tenderness in the epigastric or hypochondriac region. A hardness or tumour can be detected; there is vomiting of fluid, often having the appearance of "coffee grounds,"

which does not relieve the pain. The patient is feeble, sallow, and the emaciation is both marked and progressive.

The disease is *cancer of the stomach.*

350. The patient seldom lives more than twelve or eighteen months after the commencement of the disease. It occurs chiefly in elderly persons; the liver is often secondarily affected, and jaundice takes place. Not unfrequently the complaint is ushered in by waterbrash. The orifices of the stomach are more generally affected than the other portions. If the cardiac opening is attacked, the food seems to stick behind the sternum and is almost immediately returned; if the pylorus is the seat of the disease, you have pain occurring some time after food, and the stomach is liable to become enlarged. The chief difficulty in diagnosis is between cancer and simple ulcer of the stomach. To distinguish between them, remember that cancer is often hereditary, and seldom occurs below forty years of age; it rapidly runs its course, the pain is more severe, neuralgic, less influenced by food, and less relieved by vomiting than in simple ulcer, and the blood when vomited is smaller in quantity, and of darker colour. Above all, no tumour can be discovered in simple ulcer of the stomach. In the later stages of cancer the breath is sometimes fetid.

C. The stomach is much increased in size.

351. *a.* The stomach is found by percussion to be much increased in size, the patient complains of a burning pain and of vomiting large quantities of sour, frothy, dark coloured fluid, in which the microscope detects torulæ and sarcinæ; he is thin, pale, feeble, and emaciated.

The disease is *stricture of the pylorus.*

352. The stricture may arise from fibroid or muscular thickening, cancer or cicatrized ulcer of the pylorus or duodenum; consequently, the history of the case varies, and by the previous symptoms you will generally be able to determine the cause of the obstruction. The vomiting does not occur, as in ulcer and

cancer of the stomach, shortly after food, but may take place only once or twice a day, or be absent for many days, when *a large quantity* of frothy, fermenting, sour liquid is rejected. It is always a very chronic disease, and in some cases can be traced to blows or other injuries to the epigastrium. The abdomen is generally much distended, the superficial veins are enlarged, and in some cases the movements of the dilated stomach can be observed through the abdominal walls. The thickened pylorus can be occasionally distinguished as a hard tumour, but this is not necessarily situated in the epigastrium, as it is often displaced by the weight of the enlarged stomach, and may present itself even in the hypogastric or inguinal region.

CHAPTER VIII.

DISEASES OF THE PERITONEUM AND INTESTINES.

353. The most frequent diseases of these parts are—peritonitis, enteritis, inflammation and ulceration of the small intestines, intus-susception and strangulation of the intestine, stricture, dysentery, malignant and tubercular disease.

354. In Acute Peritonitis, or inflammation of the peritoneum, the serous membrane is opaque, reddened, and softened; the intestines are more or less adherent and covered with lymph; the abdominal cavity contains a turbid fluid or pus. In chronic peritonitis the whole of the abdominal viscera may be matted together by adhesions, and pus may be collected between the coils of the intestines, or the inflammation may have been local, and some organ may be attached to the abdominal walls or to the adjoining parts. The first effect of peritonitis is to set up fever; in case of recovery, the adhesions may form loops through which a coil of intestine may pass and become strangulated. Acute peritonitis is generally produced by the extension of inflammation from some organ covered by serous membrane, or by the escape of the contents of the stomach or intestines into the peritoneal cavity caused by ulceration. Chronic peritonitis may result from tubercle or cancer. The tubercle is deposited in the shape of small granulations beneath the serous membrane, the folds of intestine are closely united together, and not unfrequently ulceration of the mucous membrane takes place, and fæcal abscess is produced. In peritoneal cancer there is seldom much adhesion of the

intestines, but a large quantity of fluid is effused into the abdominal cavity, constituting "ascites."

355. The term ENTERITIS is generally restricted to cases in which all the coats of a portion of the intestinal canal are inflamed. The part affected is found to be dilated after death from paralysis of the muscular coat; the peritoneal coat covering it is inflamed, sometimes adherent to the neighbouring portions of gut, and the mucous membrane is much congested and covered with a layer of mucus.

356. The mucous membrane of the small intestines presents inflammatory changes similar to those observed in the stomach. *Congestion* is a frequent result of diseases of the heart and liver. In *inflammation* the mucous membrane is soft, of a red colour, and covered with a layer of closely adherent mucus; in chronic cases it is often grey, and more tough and hard than in the normal state. When the inflammation is acute, the microscope shows the bloodvessels to be congested, the tubes of Lieberkühn choked with cells and granular matter, the solitary glands enlarged, the villi granular, sometimes atrophied, or altogether destroyed. *Ulceration* most frequently accompanies phthisis and typhoid fever; Peyer's patches and the solitary glands being the parts chiefly attacked. Perforation of the intestine not infrequently occurs in fever, but is rare in phthisis.

357. In INTUS-SUSCEPTION one portion of the intestine becomes included within the part immediately below it. Slight degrees of this affection are often found in persons who have died of diseases of the brain; the condition probably taking place shortly before death. Fatal cases generally occur in children; usually the ileum becomes included in the cæcum, and this is again enclosed in the colon. The peritoneal surface of the tumour thus produced is inflamed, and when it is laid open, the included intestine is found of a dark colour, and not unfrequently gangrenous. In some rare cases sloughing takes place, and the strangulated part of the in-

testine is discharged by stool. Obstruction of the intestine may be also produced by the gut becoming entangled in adhesions, resulting from previous peritonitis, by narrowing of the canal (stricture), by the pressure of tumours, or by twisting of the bowel.

358. Inflammation of the Cæcum is named *cæcitis*, or *typhlitis*, that of the colon *colitis*. The mucous membrane of the large intestine presents morbid appearances similar to those observed in other parts of the intestinal canal; chronic ulcerations are often met with in persons who have died of other visceral diseases. *Dysentery* appears generally to commence by inflammation of the solitary glands of the colon; these ulcerate, and are destroyed, the mucous membrane of the intervening parts being red, thickened, soft, or pulpy, and covered with a purulent mucus. In persons who have died of chronic dysentery contracted in tropical climates, you will often find the coats of the intestine much thickened and indurated, and large portions of the mucous membrane destroyed by ulceration. Sometimes the colon is affected with diphtheritic inflammation, the mucous membrane being covered with a firm coating of lymph, which forms a cast of its inner surface.

359. Perityphlitis is the name applied to inflammation of the areolar tissue in the vicinity of the cæcum. It usually arises from perforation of the appendix, produced either by ulceration or by concretions contained in this part of the intestinal canal. The concretions are chiefly composed of phosphate and carbonate of lime. Peritonitis is often set up by perforation of the appendix.

360. Stricture may occur in the small or large intestine, but it is much more frequent in the latter. It generally results from cancer, commencing in the submucous coat. In other cases it is produced by the cicatrization of extensive ulcerations.

361. Tubercular Affections of the intestinal canal are exceedingly common, ulcerations of this character existing in the majority of those who die of phthisis.

The tubercle is first deposited in the solitary and Peyerian glands, softening takes place, and ulcerations are produced. They are most common in the lower part of the small intestine, but the commencement of the colon is also often implicated in the disease.

362. The symptoms that should lead you to suspect disease of the peritoneum or intestines are,—pain or tenderness of any part of the intestinal canal, swelling of the abdomen, vomiting, constipation, diarrhœa, the passing of blood or mucus by stool.

363. In every case it is necessary to inquire into the manner in which the bowels perform their functions. When constipation or diarrhœa is complained of, you should always ascertain what your patient means by the term he uses. In some persons, when in a state of health, the bowels act only once in every two or three days, in others two or three times a day. Constipation, when long continued, may produce hard swellings in the colon, which may be mistaken for morbid growths. These are most common in the cæcum and sigmoid flexure; they are generally moveable, and not tender, and are doughy when pressed by the finger. In cases of diarrhœa always examine the fæcal evacuations, for many patients describe as purging the frequent passing of scanty stools, resulting from constipation.

364. Ascertain first whether the disease has been recent, or is of long standing. If recent, begin at (365); if chronic, pass on to (389).

SECTION I.

Acute Disorders of the Peritoneum and Intestines.

365. Inquire if the patient suffers from severe pain, and, if so, commence at (367); if the pain is absent, or if, when present, it is only a slight griping, pass on to (382).

366. If the pain is severe, observe whether it is continuous or occasional, or if it is aggravated at intervals, and inquire if the patient has had previous attacks of a similar character. In every case of severe pain try whether the abdomen is tender in any part. In some instances slight pressure is sufficient to provoke pain, in others it is necessary to apply the hand firmly before it is complained of.

A. *The attack has been sudden, and is attended with considerable pain.*

367. Under this head you may have peritonitis, enteritis, colic, intestinal obstruction, dysentery, the passage of a biliary (285), or renal calculus (228).

368. *a.* There is continuous, severe, diffused pain of the abdomen, increased on movement or pressure; the abdomen is distended; the breathing is rapid and thoracic; the patient rests on the back, with the knees raised. There is frequent vomiting, foul tongue, confined bowels, quick and wiry pulse, thirst, hot dry skin, and no appetite.

The disease is *acute peritonitis.*

369. The complaint often commences with rigors and fixed pain in some part of the abdomen, sometimes with pain and difficulty in passing urine; the pain in either case diffuses itself over the whole abdomen. In some instances a friction sound can be detected with the stethoscope placed over the inflamed part. Towards death the face becomes pinched, the pulse rapid and flickering, cold sweats appear on the skin, and constant hiccup often occurs. The most common causes of peritonitis are injuries to the abdomen, cold, puerperal fever, and perforation of the stomach or intestines. In perforation the attack is very sudden, and the patient is from the first collapsed. Usually you have a history of hæmatemesis, pain after food, or other symptoms of ulceration of the stomach or intestines; but the perforation may occur in persons who have appeared to be previously in perfect health.

370. Acute peritonitis may be confounded with in-

flammation of the bladder, rheumatism of the abdominal muscles, hysteria, enteritis, and colic. In cystitis the pain is confined to the region of the bladder, and the introduction of a catheter often removes it. In rheumatism the tenderness is as great on slight as on deep pressure; there is neither the fever, rapid pulse, nor general distress of peritonitis. In hysteria the *surface* of the skin is tender, the pain is comparatively slight, the pulse is not much quickened, and vomiting is absent.

371. Partial peritonitis often occurs over the liver, stomach, uterus, and other abdominal organs, but the pain and tenderness are confined to the part affected, and the fever is comparatively slight.

372. *b.* The patient complains of pain of the abdomen, which is confined to one part and is increased by pressure. There is nausea or vomiting, confined bowels, quick wiry pulse, thirst, hot dry skin, and want of appetite. The patient lies on his back, with the knees raised.

The disease is *enteritis.*

373. This complaint often commences like colic with severe but intermitting pain; it may arise from internal strangulation of the intestine, hernia, fæcal accumulations, or from undigested food, such as raw apples, &c. You may mistake acute peritonitis, colic, or intestinal obstruction for enteritis. It is distinguished from acute peritonitis by the more local character of the pain and tenderness, by the pain being generally confined to the neighbourhood of the navel, and by the symptoms being less acute and violent: from colic, by the tenderness on pressure, the quick pulse, fever, and general prostration: from intestinal obstruction, by the early occurrence of the pain and tenderness, and the rapid progress of the case. In some cases of enteritis an increased pulsation of the abdominal aorta is observed.

374. *c.* There is severe paroxysmal pain near the umbilicus, usually coming on suddenly, but unaccompanied by tenderness on pressure; often vomiting of

bile or mucus; bowels generally confined; pulse little affected, and no great heat of the skin nor abdominal pulsation. The patient often groans or screams, rolls about, or presses on the abdomen to relieve the pain.

The disease is *colic.*

375. Many persons are subject to attacks of colic, especially those whose bowels are habitually confined; it is also one of the most common accompaniments of lead poisoning, but when this is the case you will find a blue line on the gums surrounding the teeth.

376. Colic may be confounded with peritonitis, intestinal obstruction, the passage of biliary or urinary calculi, neuralgia of the dorsal nerves, or hernia. From peritonitis it is distinguished by the absence of pain on pressure, and of fever, by the local character of the pain, and the smaller amount of depression; from gall-stones, by the sudden commencement and termination of that complaint, by the pain produced by the passage of a calculus being in the site of the gall duct, by the vomiting being generally more severe, and the fluid rejected more acid than in colic, and by the attack being followed by jaundice. The passage of a urinary calculus differs from colic in the pain affecting the back, thigh, and testis, in the frequency of urination, in the small quantity of high-coloured, often bloody, urine that is voided during the attack, and the history of small stone or gravel having been previously passed. Neuralgia sometimes simulates colic; but in it there are generally superficial tender spots in the course of the nerves, and the pain is confined to one half of the body. You seldom find severe pain in hernia, but you should in every case of colic carefully examine all the usual places of hernial protrusions.

377. *d.* The patient complains of a constipation of the bowels, that has resisted the action of purgatives; the abdomen is much distended, there is urgent vomiting, quick pulse, thirst, and loss of appetite. Usually at some period of the case fixed pain of the abdomen comes on.

The disease is *intestinal obstruction.*

378. The obstruction may arise from a portion of the intestines becoming strangulated by old adhesions or malposition of other parts of the canal; from intussusception; from stricture produced either by cicatrices, inflammation of the coats of the gut, cancer, &c.; from the impaction of a gall-stone or fæces. When the complaint is produced by internal strangulation the symptoms usually follow directly upon some sudden or severe muscular exertion, and the patient can at first point out the exact part where the pain is situated. When the gut is twisted the symptoms are more gradually developed, and pain may be absent for many days after insuperable constipation has commenced. When intussusception occurs, the first symptom is usually a colicky pain, followed by the discharge of bloody mucus; in some cases a hard tumour can be discovered where the pain is felt. If stricture has produced the obstruction, you have a history either of frequent vomiting and loss of flesh, or of obstinate constipation, according as the upper or lower part of the intestinal canal is affected. When the impaction of a gall-stone has given rise to the symptoms, they have been preceded by sévere colic and vomiting, followed by jaundice.

379. If the obstruction is seated in the upper part of the canal the vomiting begins early and is bilious, the abdomen is not much distended, and the amount of urine secreted is scanty; when it occurs in the large intestine the vomiting is late in beginning, the matters rejected are at first bilious, afterwards stercoraceous, the abdomen is greatly distended, and the shape and movements of the bowels can be often distinguished through the abdominal parietes, and the amount of urine is copious. In every case of obstruction of the bowels the patient must be most carefully examined for hernia.

380. *e.* There is griping pain of the abdomen with some tenderness in the region of the colon; frequent desire to go to stool attended with straining and the

passage of blood, mucus, or jelly mixed with lumps of fæcal matter. The patient has a furred tongue and thirst, but the skin is cool and the pulse not much quickened.

The disease *is dysentery.*

381. This disease is most common in hot climates, but it occurs also occasionally in this country. Death may take place at an early period, or the complaint may become chronic. The symptoms usually commence with rigors, chilliness, or diarrhœa; towards a fatal termination the stools are passed involuntarily, and are of a greenish colour, or like washings of raw meat. In some cases severe hæmorrhage occurs from a large artery being opened by the ulceration; in others (chiefly in tropical dysentery) abscess of the liver is subsequently produced. You may for dysentery mistake piles, morbid growths, or cancer of the colon, or rectum, but a careful examination of the gut with the finger or bougie will prevent such an error. It is distinguished from diarrhœa by the constant straining, the severe pain, and the character of the stools. In this country we generally meet with dysentery as a chronic disease,—often the result of the acute form contracted in tropical climates. The patient is emaciated, pale, and exhausted, and the disease is generally associated with chronic diarrhœa.

B. The attack has been sudden, but is not attended with much pain.

382. You have under this head, Asiatic cholera, cholera, acute diarrhœa.

383. *a.* The patient is affected with constant vomiting and diarrhœa, at first of bilious, afterwards of watery ("rice-water") stools. The face is blue and cadaverous, voice whispering, skin and breath cold, urinary secretion suppressed; pulse exceedingly feeble or imperceptible. He suffers from violent cramps in the extremities.

The disease is *Asiatic cholera.*

384. This complaint only occurs in temperate climates

as an epidemic, and when once seen can never be forgotten. The stage of collapse is usually preceded for a few days by diarrhœa; in other cases the invasion is sudden. Occasionally there is rapid sinking without diarrhœa. If the stage of collapse be overcome, the patient generally falls into a typhoid state, which often proves fatal.

385. *b.* The patient suffers from constant vomiting and diarrhœa of bilious or of pale, watery stools, usually preceded or attended by a griping pain of the abdomen, and severe cramps of the extremities. The pulse is feeble, voice husky, and there is great thirst and depression.

The disease is "*English cholera.*"

386. In children the complaint often proves fatal, but recovery usually occurs in adults, although the symptoms are sometimes apparently as severe as in the Asiatic form of the disease.

387. *c.* The patient suffers from diarrhœa, without vomiting, and generally attended with some griping pain. There is often thirst and deficient appetite, but no fever and not much depression.

The disease is *diarrhœa.*

388. You generally meet with diarrhœa produced by indigestible food; in other cases the stools consist almost entirely of bile.

SECTION II.

CHRONIC DISEASES OF THE PERITONEUM AND INTESTINES.

389. First inquire if there is severe pain, and if so begin at (390), if not, pass on to (395).

A. The patient suffers from severe pain.

390. Under this head you may meet with chronic peritonitis, cancer of the peritoneum, chronic dysentery, affections of the cæcum and its appendix.

391. *a.* The patient has pain and tenderness of the abdomen, which is clear on percussion, sometimes with

intervening portions of dulness, and retains its shape when the body is moved from side to side; the bowels are usually purged, the pulse is quick and feeble, the skin hot, appetite bad, and thirst and emaciation are present.

The disease is *chronic peritonitis.*

392. Chronic peritonitis sometimes follows the acute form, or it may be produced by an injury to the abdomen. The most frequent cause is tubercular deposit in the peritoneum. In this case there is but little fluid effused, and the intestines are glued to each other and to the abdominal walls; consequently the abdomen is clear on percussion, and this, together with the absence of disease in the heart, liver, and kidney, suffice to distinguish the complaint from ascites. Chronic peritonitis is most frequent in children, and the pain and tenderness are often but slight. In adults the greatest difficulty is to diagnose it from peritoneal cancer. In cancer, there is usually a large quantity of fluid effused, with great emaciation, vomiting, and severe pain and tenderness of the abdomen. In colloid disease there are the same symptoms as in the other forms of cancer, but you more frequently find a distinct tumour in some part of the abdomen, and the fluctuation is often very indistinct. In all cases of suspected chronic peritonitis examine the chest for tubercle and the urine for albumen.

393. *b.* The patient complains of continuous, dull pain in the right iliac region increased on pressure or motion; a tumour can be felt in this situation, which is rather dull on percussion, but the borders of which are tympanitic. The bowels are usually confined, the pulse is quickened, and there is thirst and deficient appetite.

The complaint is *inflammation of the cæcum.*

394. The disease occasionally commences with acute symptoms, but usually it is preceded by constipation. It may produce fatal peritonitis by perforation of the cæcum or its appendix, or inflammation of the cellular tissue round the gut (perityphlitis) and abscess, which

may be discharged externally or through the intestines. If the pus burrows under the iliac fascia there is much pain in moving the right leg. You may mistake for it cancer of the cæcum, but in this disease the progress is slow, the tumour is very hard, and there is often malignant disease of the liver or other organs.

B. The patient does not suffer from severe pain.

395. You may have constipation or chronic diarrhœa under this head.

396. Amongst the usual causes of constipation are want of exercise, improper food, lead poisoning, atony of the colon, affections of the brain, stricture of some portion of the large intestines. However produced, it is apt to give rise to flatulence and other signs of indigestion, palpitation, dyspnœa, giddiness, headache, heaviness after meals, and inability for much mental or bodily exertion.

397. Chronic diarrhœa may result from malaria, improper food, abuse of purgatives, ulceration of any part of the intestinal canal and other general or local causes. It is a common accompaniment of chronic diseases of the kidney and liver, phthisis, typhoid fever, diseased mesenteric glands, chronic peritonitis, and other disorders.

CHAPTER IX.

ABDOMINAL TUMOURS.

398. Before entering on the diagnosis of tumours of the abdomen, it is necessary that you should make yourself acquainted with the various morbid changes to which the abdominal organs are liable, and the signs by which these changes may be recognised. Observe if the enlargement of which the patient complains is general and uniform (399), or is confined to one part of the abdomen (411).

SECTION I.

There is a General and Uniform Enlargement of the Abdomen.

399. The enlargement may be produced by an abnormal amount of air in the stomach or intestines, by fluid in the peritoneal cavity, or by a solid tumour.

400. Commence by percussing the whole of the abdomen, and if you find the sound everywhere tympanitic, the swelling arises from an accumulation of air. If a dull sound is elicited, either over the whole or a part of the abdomen, you have to deal with fluid or with a solid tumour. You distinguish the presence of fluid in the following manner :—Place the left hand over a dull portion, and with the fingers of the right tap rather sharply over another dull part; if fluid is present the impulse of the blow will be felt by your left hand. It is easy to detect fluctuation if the peritoneal cavity is filled with fluid, but when this exists only in a small quantity you must adopt the following method of examination. Let the patient rest upon one

side, whilst you percuss the opposite side of the abdomen, where you will probably find a clear resonance. Make him now reverse his position, and if fluid is present, you will elicit a dull sound where it was before tympanitic. If you are unable to feel fluctuation, and the swelling is firm and resistant, you have to deal with a solid tumour.

401. *a.* The abdomen is generally and uniformly enlarged, and the percussion-sound everywhere tympanitic.

The enlargement is caused by *air in the intestines.*

402. Extreme flatulent distension sometimes results from atony of the colon, chronic peritonitis, or intestinal obstruction. In the first the bowels are confined and the patient is liable to colic, but there is neither fever nor emaciation. Chronic peritonitis usually arises from tubercular deposition; the abdomen is tender upon pressure, and does not change its shape with an alteration of the position of the patient; there are loss of strength and flesh, diarrhœa, a quick pulse, thirst, and, in most cases, some evidence of disease of the lungs. When the distension is produced by intestinal obstruction you have the other symptoms of this condition to guide your diagnosis (377). Flatulent distension is a common symptom of dyspepsia, and is often very distressing, especially when the patient is stout.

403. *b.* The abdomen is generally and uniformly enlarged, the sound on percussion is dull, and fluctuation can be detected.

There is *fluid in the abdominal cavity.*

404. When the fluid is contained in the peritoneal cavity the disease is termed "*ascites.*" You may mistake for ascites, ovarian enlargement, a cyst connected with the kidney, or a greatly distended bladder.

405. In ovarian dropsy the swelling is first observed in the lower part of the abdomen, and gradually extends upwards. When the patient lies upon her back, the front part of the abdomen is quite dull on percussion, whilst you may have a clear sound at the flanks,

because the fluid being contained in a cyst does not gravitate. In ascites the flanks are dull when the patient rests on the back, but a clear sound is elicited in the epigastric or umbilical region on account of the intestines floating on the surface of the fluid. In addition to this, the history of the case affords you indications of some visceral disease likely to produce dropsy of the peritoneum. Renal cysts are generally situated at one side of the abdomen, so that percussion affords a clear sound on the opposite side in all positions of the patient's body. If you suspect that the fluctuation arises from a greatly distended bladder, draw off the urine by means of a long catheter.

406. The usual causes of ascites are, diseases of the heart, kidneys, or liver, or chronic peritonitis.

407. Dilatation of the heart or diseased mitral valve frequently gives rise to ascites. In these cases œdema of the feet precedes the abdominal dropsy, and the patient has previously suffered from cough, dyspnœa, and palpitation (31, 38).

408. Ascites produced by kidney disease is usually associated with œdema of the limbs and face, and effusion into the pleura or pericardium. The state of the urine will enable you to decide as to the nature of the affection (197).

409. Diseases of the liver are the most common causes of ascites, on account of the obstruction to the portal circulation. It is generally the result of cirrhosis, the presence of which must be determined by the enlargement of the superficial abdominal veins, the emaciation of the patient, and the other symptoms of that disease (307). Ascites may be produced by cancer of the liver, and more rarely by amyloid degeneration; it seldom arises from chronic congestion, except when this results from disease of the heart or lungs; it is not an accompaniment of hydatids, fatty liver, or hepatic abscess.

410. *c.* When a solid tumour is sufficiently large to fill the whole abdomen it is generally of a malignant nature.

SECTION II.

The Tumour is confined to one part of the Abdomen.

411. Nothing but careful and repeated examinations can prevent you from making mistakes in the diagnosis of tumours of this class. In some persons, especially in women who have had large families, the abdominal muscles are apt to contract on the application of the hand, so as to give the feeling of a tumour when none exists. When you suspect this to be the case you must examine the patient in different positions, relaxing the muscles as much as possible, and meanwhile engaging her in conversation. Sir William Jenner recommends that the abdominal muscles should be relaxed by placing the patient on his back with his shoulders somewhat raised, and the back of the head propped up until the chin falls on the top of the sternum, the knees should be bent on the abdomen and supported by an assistant, whilst the feet rest on their soles. In some cases, though very rarely, it is necessary to use chloroform before you can arrive at a positive conclusion.

412. Fæcal accumulations sometimes simulate malignant and other tumours; they feel soft and doughy, and are generally situated either in the cæcum or sigmoid flexure of the colon. In all doubtful cases the bowels should be emptied, either by purgatives or by enemata, before a positive diagnosis is given.

413. The presence of an abdominal tumour is often obscured by ascites. When fluid exists in large quantity in the peritoneum, it is often impossible to determine the existence of a tumour until after tapping has been performed; but where there is only a moderate amount of liquid you can often reach the solid mass by suddenly and forcibly pressing the tips of the fingers on the abdomen so as to displace the intervening layer of fluid.

414. When you have satisfactorily determined the presence of an abdominal tumour, consider what organs

occupy the region in which it is placed, and try to trace its connexion with some one of them. Thus, if it be situated in the right hypochondrium mark out the liver, and ascertain if there is any connexion between this organ and the morbid growth.

415. Observe whether the tumour is fixed or moves during respiration; if it moves, you know that it is either connected with the diaphragm or with some organ which is depressed during respiration, such as the liver, stomach, or spleen. If it is fixed, it may be an enlargement of some structure, such as the aorta or lymphatic glands, which are permanently retained in their position, or it may be connected with a moveable organ that has become attached by adhesions.

416. Pay especial attention to the state of any of the abdominal organs whose functions are disordered. Thus, if the patient suffered from frequent vomiting of a large quantity of fermenting liquid, and the stomach was found to be enlarged, you would look upon a hard tumour as connected with the pylorus, although it might be far removed from the normal position of that part.

417. The abdomen is divided into regions in the same manner as the chest; a glance at fig. 37 and fig. 38 will make you acquainted with them.

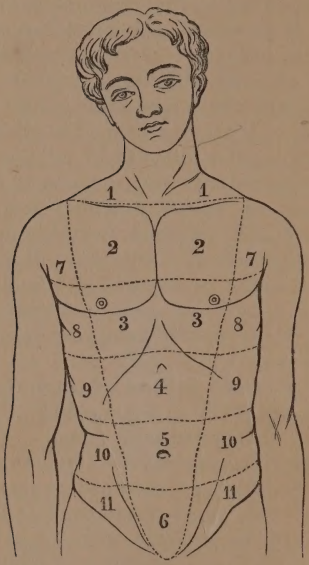
418. Right Hypochondrium.—Tumours of the liver, kidney, and gall-bladder are most generally found in this locality. You must remember that the liver may be displaced by emphysema, effusion into the right pleura, by fluid in the pericardium, or dilated heart, and thus may simulate hepatic enlargement.

419. Epigastrium.—Tumours of the liver are also found in this region. Cancer of the stomach may be recognised by the hardness and irregularity of the swelling and by the other signs of that disease (349). Cancer of the pancreas occasionally forms a tumour in the epigastrium, but its symptoms vary so greatly, according to the other structures involved, that its diagnosis is generally a matter of great difficulty. In

many cases, where no external tumour has been discovered, the urine has been proved to be saccharine, and a large amount of fat has been discharged by stool.

420. Left Hypochondrium.—Although fæcal accumulations are sometimes observed in this region, en-

Fig. 37.



4. Epigastric.
5. Umbilical.
6. Hypogastric.
9. Hypochondriac (right and left.)
10. Iliac (right and left.)
11. Inguinal (right and left.)

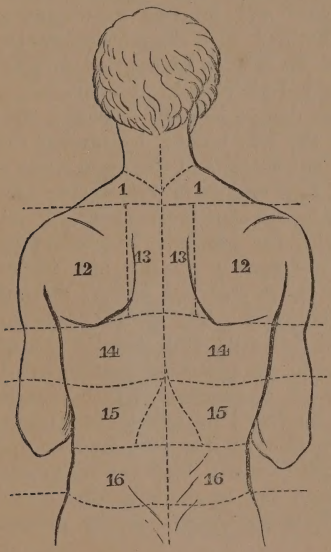
(Paxton.)

largements of the spleen form the most frequent cause of the tumours here met with.

421. You ascertain the size of the spleen by percussion and by the pressure of the hand on the abdomen

below the left hypochondrium. In percussing, remember that in a healthy person its anterior and posterior margins correspond with two lines continued perpendicularly downwards from the folds of the left axilla; there is generally a space of about two inches where you find deficient resonance on percussion. If you feel

FIG. 38.



15. Inferior dorsal (right and left.) | 16. Lumbar (right and left).

(PAXTON.)

the organ projecting below the left hypochondrium, it is almost sure to be diseased.

422. Splenic enlargement is a common accompaniment of intermittent fevers, and of certain diseases of the liver. This organ is very frequently the seat of albuminoid or "waxy" degeneration where the liver and

kidneys are also affected. In one form of this affection, the thymus and lymphatic glands are also enlarged, and the patient generally dies from exhaustion (Hodgkin's disease). The spleen when hypertrophied often attains an enormous size; it forms an oval tumour with a smooth surface, and usually presents a deep notch on its anterior border. The patient is pale, anæmic, and feeble, and is liable to profuse bleedings from the nose and mucous membranes. When the blood is examined with the microscope, the white cells are found to be in such excess that they equal, or even surpass, the red globules in number.

423. You distinguish an enlarged spleen from a tumour of the left kidney, by finding that it is uncovered by the colon, and therefore quite dull on percussion; that it readily moves during respiration; its anterior margin is sharp, often notched, not round as is the case with the kidney. In addition to these signs, the patient is usually anæmic and subject to hæmorrhage, whereas in enlarged kidney there is often blood or pus in the urine. The splenic tumour can be generally moved forwards with the fingers, and there is a space between its posterior border and the spine, in both of which circumstances it differs from enlarged kidney. The left lobe of the liver may be enlarged and in contact with a splenic tumour, but in such a case the right lobe will be found also increased in size, and the spleen can be made to alter its relation to the liver by deep inspiration, or by pressure with the hand.

424. Umbilical Region.—Tumours in this region generally result from the extension of growths connected with the liver or stomach.

425. Enlarged mesenteric glands seldom or never produce an abdominal tumour. Sir W. Jenner states that, "enlarged glands may sometimes be detected by grasping the two sides of the abdomen between the hands or between the fingers of one hand; then by bringing the fingers slowly together, you may at last

feel the glands between your fingers." When enlarged lymphatic glands are big enough to form a distinct tumour, it is fixed and cannot be moved either by respiration or pressure of the hand.

426. Aneurisms of the aorta and its branches are most generally met with in this and the epigastric region. They are distinguished by the severe neuralgic pains, the pulsating tumour, and systolic murmur that accompany them. You must, however, be on your guard not to mistake for aneurism an increased pulsation of the aorta that is commonly met with in dyspeptics, especially in females, nor the pulsation of a tumour situated over the vessel. You must endeavour to grasp the tumour on each side, and as an aneurism expands equally in all directions at each impulse of the heart, you will feel the dilatation as much at the sides as in the front, if it be an aneurism. A murmur is often produced by the pressure of the stethoscope; in case of aneurism you will often be able to hear it behind near the spine as well as in front.

427. Lumbar Regions.—Tumours here are usually connected with fæcal accumulations or with disease of the kidneys, liver, or spleen. Occasionally inflammation takes place in the cellular tissue surrounding the kidney, and abscess is the result; in other instances cancer attacks the spine or lumbar glands, and a tumour is formed in the loins.

428. You examine the size of the kidneys by pressing the fingers into the lumbar regions whilst the patient lies flat upon his face, or rests upon his hands and knees. Sir W. Jenner recommends that "you should place one hand at the back of the patient under the last rib, and outside the mass of the lumbar muscles in the spinal groove; the other you put in front of the patient, just over the hand behind, on the right side, just under the inferior border of the liver. Having put your hands in these positions, so as to have the kidney well between them, depress the hand on the anterior wall of the abdomen as far as possible, diverting the patient's atten-

tion, and removing the tension of the muscles. Then having depressed that hand as far as possible, using all possible means to expedite and assist its depression, having brought it down as much as possible, tilt forward the hand that is behind; and in that way the kidney is brought well under the touch of the two sets of fingers—perfectly, in the great majority of cases."

429. Remember that tumours of the kidney almost always increase *anteriorly* where there is least pressure; in case, therefore, you find an enlargement in the situation of these organs near the spine, it is in all probability not renal.

430. Iliac Regions.—Diseases of the cæcum, inflammation of the cellular tissue surrounding it, or diseases of the ovary, are the most usual causes of tumours in this locality. Ovarian tumours are distinguished by their mobility, their connexion with the uterus, and the small amount of disturbance of the general health they appear to produce.

431. Hypogastric Region.—Diseases of the bladder and uterus usually produce the tumours found in this region. Sometimes, in chronic peritonitis, pus is found enclosed in a sac formed by the coils of intestine adherent to each other.

CHAPTER X.

DISEASES OF THE BRAIN AND SPINAL CORD.

432. The chief diseases to which the brain and its membranes are liable are—acute and chronic meningitis, hydrocephalus, congestion of the brain, encephalitis, abscess, hæmorrhage, softening, and tubercular, cancerous, and other tumours of the brain. The spinal cord is liable to meningitis, inflammation of its substance, softening, and tumours.

433. Meningitis, or inflammation of the membranes of the brain.—The bloodvessels of the pia mater are much enlarged and loaded with blood, the arachnoid is opaque, lymph, or in some cases pus, being situated beneath it. The pia mater is stripped with difficulty from the surface of the brain, which is soft and easily torn away. Microscopically, the smaller bloodvessels are covered with fat and granular matters, and often present dilatations in various parts. The first effect of meningitis is to excite general fever; the exudations are apt to produce compression of that part of the brain over which they are situated, and thus to give rise to convulsions or paralysis. Meningitis is almost always associated with inflammation of the surface of the brain itself. A common cause of meningitis is the deposit of tubercle in the pia mater.

434. Hydrocephalus, or water in the brain.—This disease consists in the effusion of fluid into the ventricles of the brain. It may occur as an acute or a chronic complaint.

435. Acute Hydrocephalus, also called "Tubercular Meningitis."—The surface of the brain is flattened, the ventricles are filled with fluid, and the

substance of the brain is soft and pulpy; the membranes at the base of the organ are thickened, opaque, and studded with small white miliary tubercles; the membranes on the upper surface are usually but little affected. Tubercles are generally present also in the lungs or other organs.

436. In CHRONIC HYDROCEPHALUS the head becomes greatly enlarged, the bones of the skull widely separated, the fontanelles are open; the ventricles of the brain are distended with fluid, and the substance of the organ is softened.

437. CONGESTION OF THE BRAIN is characterized by fulness of the bloodvessels, so that an unusual number of bloody points are visible when the substance of the organ is divided.

438. ENCEPHALITIS, or inflammation of the substance of the brain, may occur as a general or local disease. General encephalitis is usually associated with meningitis. Local encephalitis presents itself as "red softening," or abscess.

439. In RED or INFLAMMATORY SOFTENING, the substance of the brain is soft, of a red colour, often presenting numerous bloody points, and its specific gravity is increased. Microscopically, you find the tubes of the brain broken up and mixed with granular matter and dark, granular, fatty bodies, like mulberries, named "exudation corpuscles." The minute arteries are covered with granular and fatty matters.

440. ABSCESS OF THE BRAIN generally results from injuries, or diseases of the bones, or from pyæmia. The most common cause is caries of the internal ear. It may be "encysted" in the substance of the brain. Microscopically, you do not necessarily find true pus-cells in the contents of the abscess, but only granules and exudation corpuscles in various stages of degeneration.

441. In WHITE or NON-INFLAMMATORY SOFTENING of the brain, the affected part is soft, and of a white or yellow colour, but its specific gravity is not increased. Microscopically, there are no "exudation

corpuscles," but only broken down brain-structures. It results from imperfect nutrition, and is generally caused by disease or obstruction of the cerebral arteries.

442. Hæmorrhage of the brain is the most frequent cause of apoplexy and paralysis; it may take place above the dura mater or into the sac of the arachnoid, or into the substance of the brain. It usually occurs in or near the corpus striatum or optic thalamus. When the patient survives, the fluid part of the blood is absorbed, the coagulum dries up, the surrounding cerebral substance, at first torn and softened, becomes of natural consistence, and either a cyst is formed or a cicatrix alone remains. Cerebral hæmorrhage is usually caused by disease of the blood-vessels of the brain, or by aneurisms of the arteries; it often accompanies granular degeneration of the kidneys.

443. Tubercle frequently presents itself in the membranes of the brain, producing tubercular meningitis. In other cases it forms a round, firm, yellow, cheesy tumour, situated in the cerebral substance, generally in the cerebellum. These tubercular tumours are scarcely ever found in adults.

444. Cancer affects the brain in different forms, and other varieties of morbid growths also present themselves in the cerebral substance.

445. Spinal Meningitis, or inflammation of the membranes of the spinal cord, presents morbid changes similar to those caused by inflammation of the cerebral membranes.

446. Myelitis, or inflammation of the spinal cord, usually ends in softening; and the appearances are similar to those of cerebral softening.

447. In Locomotor Ataxia, atrophy and degeneration of the posterior columns, and of the posterior roots of the spinal nerves, sometimes of the posterior cornua of the grey matter, have been found by the microscope. The membranes are generally normal.

448. In Wasting Palsy, isolated parts of the spinal

cord have been found in a state of degeneration. The muscular structure of the affected parts is completely wasted; it appears pale and soft, and microscopically the fibrils seem fatty or granular.

449. The symptoms that should lead you to suspect disease in the nervous centres are,—any alteration in the mental functions or in the powers of motion or sensation, severe or long-continued pain in the head or spine, affections of the sight or hearing unconnected with structural changes in the organs through which these senses are manifested.

450. As you have to trust chiefly to symptoms, you will find more uncertainty in the diagnosis of this class of diseases than in those before described; greater care and more minute attention to the history of each case is necessarily required.

451. One of the means of physical diagnosis that you will find occasionally useful is the ophthalmoscope; but a considerable amount of practice is required to enable you to employ it. The form of instrument most generally used consists of a slightly concave mirror and a double convex lens.

452. When about to use the ophthalmoscope the patient must be placed on a chair in a darkened room, whilst you seat yourself exactly opposite, and slightly above him. A gas or other bright lamp should be placed on a level with and on the same side, but a little behind the eye you wish to examine. Supposing you are desirous of looking into the left eye, take the handle of the mirror in your right hand and adjust its central perforation to your right eye. Then throw the light from the mirror upon the eye, and vary your distance until you observe the pupil brightly illuminated. Keep the mirror in this position, and place the convex lens a little distance before the pupil. Direct the patient now to look at the wall over the tip of your left ear, and by slightly varying the distance of the lens you will soon catch a view of a retinal bloodvessel. Trace this in the direction of its increasing thickness until you see a

white circular patch from which the vessel seems to emerge; this is the "optic disc." The optic disc is a nearly circular, well defined, reddish-white patch, through which the retinal arteries and veins enter the eye. The arteries are smaller and lighter coloured than the veins; the main trunks of both pass upwards and downwards before dividing into branches (see figs. 39 and 40.)

453. In each case that comes before you, first observe whether there is any striking alteration in the mental condition of the patient. If so, begin at (454); if not, then investigate the state of his powers of motion (485); if you still feel in doubt as to the nature of the disease, ascertain if there be any change in the size of the head (518), or any changes of sensation (522). In the progress of a single case all the functions of the nervous system may undergo a change, but by inquiring into the history of the disease you will generally find which has been most prominently affected.

SECTION I.

There is an Alteration in the Mental Condition.

454. You may find the mental powers suspended, as in coma (455), or their activity much increased, as in delirium (472). In deep coma the patient can neither answer questions, nor is he sensitive to light or other stimuli; the breathing is heavy, often snoring; swallowing is difficult or impossible. In delirium the mind is in a state of intense activity; the patient is constantly talking in a rapid, rambling manner, ever changing his position, and often so violent as to require restraint.*

A. You find suspension of the mental faculties.

455. Under this head you may have apoplexy,

* I do not here enter on the subject of insanity, as the student is not likely to meet with such cases in the wards of a general hospital.

sunstroke, catalepsy, acute hydrocephalus, convulsions, and epilepsy. In the first three of these the loss of consciousness is generally rapid: epilepsy attacks the patient from time to time. In typhoid fever, meningitis, and many other diseases, loss of consciousness occurs towards the termination of the case, and the diagnosis must be determined by its history and that of the patient.

456. *a.* The patient suddenly falls into a state of stupor, the pupils of the eye are dilated, the respiration is laborious and snoring, the swallowing difficult, the power of the limbs is lost; the pulse slow, sometimes irregular and intermitting.

The disease is *apoplexy.*

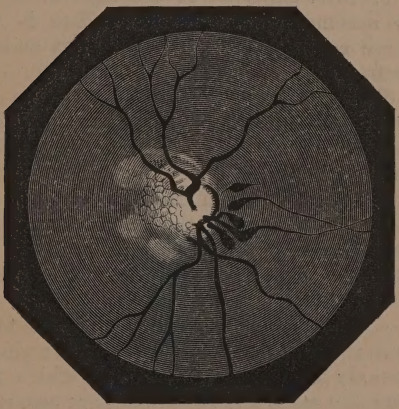
457. Apoplexy may arise from congestion of the brain, the rupture of a bloodvessel in the brain or its membranes, or from disease of the kidneys. When from congestion, the patient has usually been affected before the fit with nausea, giddiness, dull pain of the head, sleepiness, and inactivity of the body and mind. In disease of the kidneys you have frequently convulsions, the attack is more gradual than in the other forms, there is often no snoring, and the urine contains albumen. If the fit has been produced by hæmorrhage into the substance of the brain, there is generally hemiplegia recognised during profound coma by the twisting of the mouth, and the loss of power in the limbs of one side.

458. In hæmorrhage into the ventricles there is profound coma, with general paralysis and rigidity of the muscles. When the bleeding occurs into the arachnoid the symptoms are similar to those of ventricular hæmorrhage. Rigidity or tonic contraction of the muscles is a sign of extensive hæmorrhage, with laceration of the substance of the brain. When hæmorrhage has taken place into the pons Varolii, the pupils may be contracted instead of being dilated, and there may be at first neither stertor nor paralysis.

459. Inflammation of the retina is very common in

kidney disease (217), and examination with the ophthalmoscope may therefore prove useful in diagnosis. In the early stage the retinal veins are full, dilated, and tortuous, and extravasations appear in different parts; the optic disc is hyperæmic, or bluish-grey from serous infiltration. At a later stage the optic disc becomes swollen, and its outline is gradually merged into the retina, white spots or patches appear at a little distance from the disc, or they form a broad, glistening, white

FIG. 39.



"A case of retinitis albuminuria. The optic disc was ill-defined; the vessels were large and tortuous; on the apparent inner side were several small ecchymoses, evidently proceeding from the retinal vessels. On the apparent outer side was a hazy circle, indicating subretinal effusion, and at several points were white spots." (POWER.)

mound around the disc. The above drawing shows these appearances.

460. Coma may arise from an injury to the brain; therefore, when you have no history of the attack,

carefully examine the scalp for any marks of violence. Apoplexy may be confounded with poisoning by spirits or opium. In the former case, the face is usually flushed instead of pale, the pulse quick, the breath smells of spirits, the patient can be often roused to answer questions, the loss of motor power is seldom complete, and there are no convulsions. In the latter case, the pupils are contracted, there is no stertor, and the coma gradually deepens. In fainting the patient is unconscious, but the face is pallid, the pulse scarcely perceptible, and the respiration quiet.

461. *b.* After exposure to the heat of the sun the patient becomes unconscious, the face is pale, the pupils are contracted, the breathing is snoring, the pulse is frequent and feeble.

The disease is *sunstroke.*

This disease is rare in this country. It is usually preceded by sleeplessness, giddiness, heat, and dryness of skin, frequent desire to pass water, and in some cases by convulsions. In case of recovery, it is not followed by paralysis, but the attack very often leaves persistent headache, inability for mental exertion, giddiness, and in some cases it is followed by epileptic attacks or insanity.

462. *c.* The patient (a female) appears to be unconscious, the eyes are open, the body is rigid, and the limbs remain fixed in any position in which they may be placed, the pulse and respiration are natural.

The disease is *catalepsy.*

463. This complaint is very rare, and is generally connected with disordered uterine functions. The attacks may continue only for a few minutes, or they may last for hours. A modified form of this complaint is sometimes observed in persons of either sex affected with softening of the brain.

464. *d.* The patient (a child), after having suffered from the symptoms of tubercular meningitis, gradually sinks into a state of unconsciousness; the eyes are dull and heavy, or squinting, the fontanelle is convex and

prominent, the respiration often sighing, the pulse slow, but becomes more rapid when the child is raised up in bed.

The disease is *acute hydrocephalus.*

465. In very young children the first symptoms that attract notice are generally vomiting and constipation of the bowels; the eyebrows are contracted, the head is hot, the pulse is quick, and the child suddenly screams as if in severe pain; he starts at any unusual sound, and is unwilling to be roused, and the respiration is often sighing. As the disease advances to its close the coma deepens, and either the patient sinks from exhaustion, or is cut off by convulsions. Acute hydrocephalus is almost always preceded by loss of flesh, with other signs of failing health, for some weeks or even months before the attack comes on.

466. Hydrocephalus may be simulated by a state of exhaustion produced by diarrhœa or insufficient feeding. In this condition ("*hydrocephaloid disease*") the child is insensible, but the fontanelle is depressed, the head is cool, the face pale, and the bowels are usually purged.

467. The ophthalmoscope may be used in the diagnosis of both acute and chronic meningitis. In tubercular meningitis it is said that the optic disc is œdematous, the retinal veins are dilated, extravasations take place, and in some cases small, circular, prominent tubercles may be distinguished in the choroid (fig. 40). In chronic meningitis it is said that you may meet with serous infiltration of the optic disc, hæmorrhages, and fatty exudations.

468. *e.* The patient is subject to attacks, in which he falls suddenly to the ground in a state of unconsciousness; the face is distorted, the limbs are violently convulsed, the lips blue, froth issues from the mouth, and the tongue is often bitten; the pulse is sometimes scarcely perceptible.

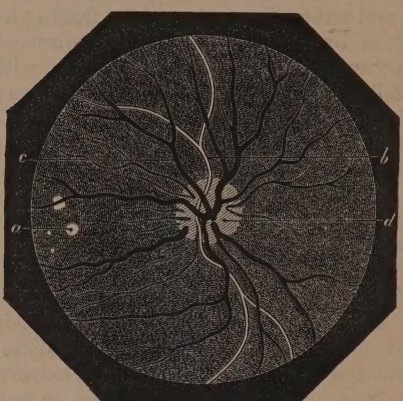
The disease is *epilepsy.*

469. The attacks seldom last more than a quarter

of an hour, and are succeeded by a deep, heavy sleep. During the intervals the patient may be in good health, but the mind usually becomes gradually enfeebled, and he displays a want of physical and mental energy.

470. Epilepsy may arise from disease of the brain, or from syphilis, or it may be produced by irritation in some other organ. The attacks are often preceded for a few seconds by a sensation (termed the "aura") originating in some part of the body or limbs, and

FIG. 40.



Representation of the appearances seen with the ophthalmoscope in a case of tubercle of the choroid. *a.* Tubercle in the choroid. *b.* Artery of the retina. *c.* Veins of the retina. *d.* Optic disc. (BOUCHUT.)

rising to the head. In some, the unconsciousness lasts only for a few moments, the patient does not fall, and there are no convulsions. In others, the fit is ushered in by spasms, or delirium takes the place of unconsciousness.

471. Epilepsy may be simulated by hysteria, but in the latter the unconsciousness is less complete, the

patient is sensible to the dashing of cold water on the face, the convulsions are, at any rate, to a great extent under the control of the will, they do not occur during the night, and the tongue is not bitten. Also, during the intervals of the attacks, the patient is liable to palpitation, pain of the left side, choking in the throat, or attacks of laughing and crying.

B. The patient suffers from delirium.

472. Remember that some amount of delirium, especially at night, is common whenever there is much fever. Thus it often presents itself in the inflammation of any important organ; and in young persons a temporary state of delirium may arise even from dyspepsia; or it may be induced by narcotics, such as Indian hemp.

473. In the following complaints delirium is a prominent symptom, lasting for some time, and continuing both day and night—typhoid and typhus fever, acute meningitis and delirium tremens; all are acute disorders.

474. *a.* Along with delirium, often of a furious character, the patient complains of acute pain of the head, aggravated at intervals; there is intolerance of light and sound, inability to sleep, great restlessness; the face is flushed, the head hot, the pulse quick and hard, the tongue is coated, all food is vomited as soon as taken, and the bowels are confined.

The disease is *acute meningitis.*

475. In the early stage the patient is attacked by rigors, followed by headache and vomiting. If the complaint is about to terminate fatally the headache lessens, twitchings or convulsions come on, the patient becomes comatose, the pulse is small and thready, the tongue hard and brown.

476. Acute meningitis may arise from injuries to the head, spirit drinking, syphilis, excessive care or anxiety. It is often produced by disease of the ear or nose; and therefore, in every case examine these organs very carefully. It is frequently the result of tuber-

cular deposit in the membranes of the brain; in adults examine the chest, and in children ascertain the previous state of health.*

477. Inflammation of the surface of the brain generally accompanies this complaint. You distinguish uncomplicated cerebritis from meningitis by the absence in the former of severe agonizing headache, and by its being generally ushered in by hemiplegia or convulsions. Typhoid fever is known from meningitis by the relaxation of the bowels, the smaller amount of headache, the absence of vomiting, the eruption on the skin, and the slowness of development of the complaint. In typhus fever you have muttering, not furious delirium, the strength is from the first prostrated, and the peculiar eruption presents itself. Acute mania differs from meningitis in the cleanness of tongue, in the absence of headache, thirst, and vomiting, and in the smaller rapidity of the pulse. The indications given by the thermometer are of great value in the case of fevers.

478. *b.* In addition to delirium the patient is exceedingly restless and unable to sleep; he has hallucinations of the senses, (he sees animals, such as beetles, mice, &c.) his hands tremble, the face is pale, the skin is covered with perspiration, the pulse feeble and quick. His history shows that he has been in the habit of drinking to excess.

The disease is *delirium tremens.*

479. The chief difficulty in diagnosis is between this disease and meningitis, for the latter may also arise from drunkenness, although it is relatively to the former very rare. You distinguish them by the severe headache, the hard, quick pulse, the heat of the head, and the raving of meningitis.

480. A form of delirium tremens occurs in persons whose occupation exposes them to lead poisoning. In

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* Acute tubercular meningitis in children has been already described as acute hydrocephalus (464).

such you will find a blue line on the gums round the teeth, and they have generally suffered previously from lead colic, or palsy.

C. The patient suffers from gradual diminution of his mental powers.

481. Under this head you may meet with chronic softening of the brain, chronic meningitis, and paralysis of the insane (495).

482. *a.* The intellect is gradually impaired, especially the memory of recent events, the temper irritable, the face becomes dull and expressionless, there is a tendency to laugh or cry on the least emotion. This condition is often followed by paralysis.

The disease is *chronic softening of the brain.*

483. This complaint frequently follows hæmorrhage into the brain or acute softening. It may also arise from disease of the bloodvessels, general debility, excessive mental effort, tubercular or other tumours, epileptic attacks, congestion of the brain, or syphilis.

484. In *chronic meningitis* you have nearly the same symptoms as in softening of the brain; but there is more headache, irritability of temper, and occasional delirium. It is not preceded or accompanied by palsy, and there is usually a history of some injury to the head, rheumatism, or syphilis.

SECTION II.

The prominent Symptoms are those of Alterations in the Power of Motion.

485. The muscular power may be diminished or lost (paralysis) (486); or it may be increased and involuntary (507).

A. You have diminution or loss of muscular power.

486. You ascertain the loss of muscular power in different ways. Direct the patient to move the palsied part, and the muscles are seen to obey his will imperfectly or not at all; thus, one side of the face being

paralysed you ask him to laugh, and you will see the mouth drawn to the opposite side. In some cases you test whether the reflex action is intact; as, for instance, by tickling the sole of the foot and observing if the leg is drawn up involuntarily. In others you apply electricity to ascertain if the muscles are able to respond to that stimulus. Always remark, whether with the palsy, there are any cramps or contractions of the muscles, and if so, at what stage of the disease they have occurred.

487. Sensation is often impaired when the power of motion is defective. You ascertain this by inquiry, or for greater exactness you may measure with a pair of compasses the smallest distance to which their points can be separated, in order that the patient may be sensible of the contact of both. The "muscular sense" may be impaired whilst the sensibility of the skin is perfect. In this case the movements of the part affected are awkward and irregular, and can only be performed when the will is strongly directed to the object, or when the muscles are assisted by the eyesight.

488. In the following diseases the loss of motor power is a prominent symptom, and arises from an affection of the brain—hemiplegia, tumour of the brain, and paralysis of the insane; the next two are connected with disease of the spinal cord—paraplegia, and locomotor ataxia.

489. *a.* The patient is paralysed on one side of the face, tongue, and body; the face is drawn to the opposite side from that palsied, speech is generally imperfect.

The disease is *hemiplegia.*

490. This complaint generally comes on suddenly. It is often preceded by symptoms of apoplexy; in other cases there is a sudden loss of speech and power of motion without the consciousness being affected. The patient may gradually recover, or the attack may be followed by softening of the brain. The arm is the latest part to recover its powers.

491. Hemiplegia may arise from chorea, epilepsy,

hysteria, softening of the brain, or hæmorrhage. In chorea the loss of power is preceded by the peculiar muscular twitchings of that disease. The hemiplegia of epilepsy follows a fit, usually soon disappears, but is apt to return after each convulsive attack. In hysterical palsy the face or speech is seldom affected, the whole side is not equally paralysed, and the patient exhibits other symptoms of hysteria. When softening has produced the hemiplegia, there is usually no loss of consciousness, and the muscles of the affected parts are relaxed; the attack has been preceded by giddiness, headache, impairment of the mental powers, or irritability of temper; the heart is generally feeble, and in young persons its valves are often found to be diseased. When hæmorrhage has taken place in the brain, there is a loss of consciousness at the commencement of the palsy; the attack occurs when the patient seems in good health, the muscles of the affected limbs are often contracted, and you will frequently discover either evidence of granular disease of the kidneys, or the hard thickened feeling of the artery at the wrists and a white ring surrounding the cornea will show that the arteries of the brain are probably diseased. After the first shock is over, the condition of the mental faculties and the articulation soon improves, if the attack has been caused by hæmorrhage; but in cases of softening, the mind remains enfeebled, and recovery in other respects is slow. Hemiplegia not unfrequently results from the obstruction of some of the cerebral arteries by clots detached from diseased valves of the heart.

492. You may have an imperfect form of hemiplegia from congestion of the brain; or it is sometimes preceded by loss of power in the parts supplied by particular nerves, as the tongue or eyelid. Paralysis of the portio dura often occurs from cold, but in this case the patient is unable to close the eyelids from loss of power in the orbicularis, and the muscles do not respond normally to electricity as they do in the palsy of cerebral origin.

493. When the affection of the brain has occurred

above the pyramids, where the motor nerves decussate, the palsy takes place on the side of the face and body opposite to that which is injured. In some rare cases, disease attacks the cord just below the decussation, and then the palsy is on the same side as the disease, and the nerves of the face are not affected.

494. The muscles of the palsied limbs may be relaxed at the time of the attack, as in softening of the brain; or contracted when the nervous matter is irritated by a clot; or the muscles, at first relaxed, may subsequently become contracted, from inflammation or irritation set up during the cicatrization of the injured parts of the brain. In long-standing cases the limbs may, however, become contracted from changes in the muscles and tendons of the parts affected.

495. *b.* The patient, with symptoms of disordered intellect, gradually loses the powers of sensation and motion, his lips and tongue are tremulous, and he is unable to pronounce his words, or does so imperfectly.

The disease is *paralysis of the insane.*

496. In some cases the mental changes are not well marked in the early stage, and the difficulty of articulation and the gradual paralysis chiefly attract attention. Atrophy of the optic nerve is generally present.

497. In atrophy of the optic nerve there is "a pale, white or bluish-white discoloration of the papilla, diminution in the calibre and number of the little nutritive bloodvessels upon the expanse of the disc, attenuation of the retinal vessels, more especially the arteries, and frequently a peculiar excavation of the optic nerve."*

498. The student must remember that the powers of motion, of sensation, and of the co-ordination of muscular action in the limbs, depend on the integrity of the spinal cord. In the following diseases these functions are affected.

499. *c.* The patient has an awkward, unsteady gait,

* Soelberg Wells "On Diseases of the Eye."

the heels first coming to the ground; when his eyes are closed he reels and tumbles, when sitting he can move his legs strongly, sensation in the affected limbs is very imperfect. He gradually loses his powers of motion and sensation.

The disease is *locomotor ataxia.*

500. The patient is first attacked with wandering, sharp, piercing pains of the limbs, occurring in paroxysms; often with double vision and unequal contraction of the pupils. There is no imperfection in the powers of the bladder or rectum. The disease is always very slow. There is usually atrophy of the optic nerve, but this seldom occurs in the early stages.

501. *d.* After numbness or altered sensation in the legs and feet, a gradual loss of motion and sensation is experienced in the lower limbs. The patient drags his legs when walking, or loses all power over them, and also over the bladder and rectum. There is usually pain over the spine, increased on pressure.

The disease is *paraplegia.*

502. The extent of the palsy depends on the amount of disease in the cord; only the lower limbs, or both the upper and lower may be affected, according to the seat of the lesion of the spinal cord. Paraplegia may arise from hysteria, disease of the urinary organs, softening of the spinal cord, or tumours, &c., compressing the cord. In hysteria it is mainly the result of disordered volition, and the paralysis is seldom complete; it varies greatly in amount, and other hysterical symptoms are present. In diseased kidneys or bladder the affection of the urinary organs has preceded the palsy. Occasionally inflammation of the spinal cord occurs as an acute affection, but generally it is of slow development.

503. You distinguish locomotor ataxia from paraplegia by the characteristic pains of the limbs and the affections of the sight and hearing that generally accompany the former, by the functions of the bladder not being much affected in it, and by the muscular

power of the limbs being intact when the body is in the sitting position.

504. *e.* Weakness of some muscle or group of muscles gradually takes place (usually those of the ball of the thumb or the deltoid are first affected), followed by their wasting and gradual disappearance.

The disease is "*wasting palsy.*"

505. The course of this disease is generally very chronic, and life is often destroyed by the muscles of respiration becoming implicated.

506. You may have local paralysis from other causes. Thus the throat is sometimes palsied after diphtheria, or the upper eyelid or even the whole side of the body may suffer in this way in children from the irritation of teething. Workmen in lead are liable to palsy of the extensor muscles of the forearm; but the peculiar dropping of the wrist, the discovery of the blue line round the gums, the probable existence of colic, and the nature of the occupation, will in such cases direct your diagnosis.

B. *You find increased and involuntary muscular action.*

507. When this affects only a part of a limb it is named *spasm;* when excessive and involuntary muscular action is general, and attended with unconsciousness, it is called *convulsion.* Spasms, again, may be "*tonic,*"—that is, continuous; or "*clonic,*"—that is, alternating with short intervals of relaxation. Convulsions occur at all ages and in different diseases. Children are most liable to them, and at an early period of life they often usher in eruptive fevers, or they may be produced by teething, worms, or other causes of irritation. They also occur in various diseases of the brain.

508. In the following diseases, the whole or large portions of the muscular system is affected with increased and involuntary action—tetanus, hydrophobia, and chorea. In paralysis agitans, mercurial tremor, and writer's cramp, the complaint is usually of a local character.

509. *a.* The muscles of the body are stiff and rigid, the features retracted into a characteristic grin, painful spasms occur at frequent intervals, severe pain is experienced shooting from the epigastrium to the back.

The disease is *tetanus.*

510. Tetanus generally follows some injury, although it sometimes occurs idiopathically. The first symptom is stiffness about the back of the neck and jaw, whence it spreads over the whole body. The pulse is quick, the bowels confined, and thirst and fever are generally present. An overdose of strychnia produces similar symptoms; but the spasms come on suddenly, they affect the whole body at once, and they are not continuous as in tetanus.

511. *b.* There is violent spasm of the throat on attempting to swallow, great restlessness, want of sleep, often maniacal excitement. The pulse is feeble, the skin covered with sweat, and saliva is secreted in increased quantity. The patient has some weeks or months previously been bitten by a dog or cat.

The disease is *hydrophobia.*

512. This disease is rare, and is generally readily recognised by the patient's dread of drinking.

513. *c.* The muscles are affected with a jerking, painless, involuntary motion; the tongue is projected from the mouth with a jerk and as suddenly withdrawn; the limbs cannot be kept at rest, the muscles of the face twitch, the speech is often hesitating.

The disease is *chorea.*

514. The hands and arms are generally first affected, and often to a very slight degree, but the unsteadiness gradually extends to other parts. Occasionally only one side of the body is attacked, but generally both. In many cases there is a murmur at the mitral valve. The urine is often of high specific gravity. This disease seldom attacks persons above twenty years of age.

515. *d.* The parts affected are continually shaking; at first the muscles can be steadied by an effort of

the will, but afterwards their motions are beyond control.

The disease is *paralysis agitans.*

516. When the hands are attacked the power of writing is lost; when the neck suffers the head is constantly shaking, and eventually droops. In many there is a tendency to stoop, and they are obliged to run when they attempt to walk. It chiefly affects old persons.

517. *Mercurial tremor* is a trembling form of palsy that affects persons whose occupations oblige them to use mercury. *Writer's cramp* is a painful cramp affecting the hand and fingers of clerks and copyists whenever an attempt is made to use a pen. It probably arises from over-action of the muscles.

SECTION III.

You find the Head much Increased in Size.

518. There are only two diseases in this class—viz., chronic hydrocephalus, and hypertrophy of the brain.

519. *a.* The skull is much increased in size, especially at its upper part; the fontanelles are often unclosed, the eyes protrude and are directed downwards.

The disease is *chronic hydrocephalus.*

520. In the early stage the child may appear in perfect health, but as the disease progresses it becomes irascible, feeble in body and mind, and subject to convulsions. Nutrition is generally impaired. The disease usually begins in children below six months of age.

521. *b.* Hypertrophy of the brain is a rare affection, in which, excepting the increased size of the head, there are at first no symptoms. The enlargement begins at the occiput, and the eye remains deep; there is no prominence of the fontanelles.

SECTION IV.

You find that the Patient suffers from Severe Pain of the Head without Fever, the Intellect and Power of Motion being unaffected.

522. Headache may arise from dyspepsia, rheumatism, neuralgia, chronic disease of the brain.

523. Dyspeptic headache is recognised by the pain being aggravated after food, or accompanied by obstinate constipation, bilious vomiting, acidity, or other signs of disordered digestion. In rheumatism, the scalp is tender, and the patient has suffered from the complaint elsewhere. If the pain is nocturnal, and there are tender swellings on the head, it is probably caused by syphilis, and you must inquire into the previous state of the patient's health. Neuralgia is chiefly felt in the course of some of the nerves of the face or head, and the pain is liable to periodical exacerbations; the most common seat of the pain is the temple, and you will then often find disease of the teeth or gums. Sometimes you will be able to trace the complaint to gout or ague. Various chronic diseases of the brain and its membranes are attended with pain, but they must be diagnosed by their other symptoms.

CHAPTER XI.

FEVERS.

524. Almost every inflammation is attended with the symptoms of fever—viz., quick pulse, thirst, hot, dry skin, loss of appetite, scanty, high-coloured urine, confined bowels, and general restlessness or great weakness. In case, therefore, you meet with these symptoms, you must first examine the condition of all the principal organs, so as to find if there is any local cause sufficient to account for them. Remember that in children slight affections, such as teething or indigestion, may give rise to sharp febrile symptoms. You should not conclude, however, because you find some organ affected, that it has necessarily produced the fever, for every fever is liable to give rise to local inflammations. To arrive at a correct diagnosis you must carefully inquire into the history of each case, and discover whether the symptoms of the local disorder, or those of the fever, were first developed.

525. In the diagnosis of fevers you will require all the means of physical diagnosis you have already learnt to employ in the investigation of the diseases of each organ. In addition to them, the thermometer is necessary to enable you to obtain correctly the temperature of the patient. A little care is required in the use of the thermometer. Introduce the bulb of the instrument below the fold of the skin covering the edge of the pectoralis major muscle, and keep it in close contact with the axilla for five minutes, having previously warmed it by contact with the hand. Read off the degree of temperature to which the mercury has risen before removing the thermometer, unless it

has a self-registering scale attached to it. The observations should be taken twice in the day, from seven to nine in the morning, and from five to seven in the evening, being the most suitable times. The normal temperature of the axilla is 98·4,° and any notable deviation from this betokens ill-health. In addition to the temperature you should record at each visit the state of the pulse, and the number of respirations the patient makes in a minute.

526. It is sometimes desirable to ascertain, by chemical analysis, the rate at which the destruction of the tissues is going on. You do this by estimating the amount of urea excreted in the twenty-four hours. The following is the most easy method :—

527. "A measuring tube, twelve or fourteen inches long, is provided, easily closed by the thumb, and graduated to tenths and hundredths of a cubic inch. This tube is filled rather more than one-third full of mercury, and a measured quantity (50 to 60 grs.) of urine poured into it. The tube is then quickly filled to the brim with solution of hypochlorite of soda, closed by the thumb, and inverted under a saturated solution of common salt (which being heavier than the solution in the tube, prevents its escape), contained in a small mortar. The tube is allowed to stand for three or four hours, or until the volume of the nitrogen ceases to increase, and the amount of urea is calculated" (1·549 cubic inches of nitrogen gas, representing 1 gr. of urea). "In this process the carbonic acid is retained by the excess of chloride of soda employed." "To prepare the solution of hypochlorite of soda, 500 grs. of good chloride of lime (bleaching powder) are stirred with boiling water, filtered, and the residue washed once or twice with the boiling water; 1000 grs. of crystallized carbonate of soda are dissolved in a little water, and added to the solution, which is then filtered and made up to 20 oz. with water."*

* Bowman's "Medical Chemistry."

528. Having ascertained that the febrile symptoms under which the patient labours are not dependent on any local disorder, examine if there is any well-marked eruption on the face, body, or extremities. If such is the case, and the spots have appeared within the first four days of illness, begin at (529). If the eruption has appeared at a much later date, or if, without any rash upon the skin, the symptoms of the fever have been continuous, pass on to (545). If there is no eruption, and the fever recurs at regular periods, subsiding in the intervals, pass on to (558).

SECTION I.

THE FEVER IS ATTENDED WITH A WELL-MARKED ERUPTION ON THE SKIN, WHICH HAS APPEARED WITHIN THE FIRST FOUR DAYS OF THE ILLNESS.

529. Under this head you meet with,—scarlatina, measles, erysipelas, small-pox, chicken-pox; the onset of these fevers is generally sudden.

530. *a.* On the fourth day of the illness there has appeared, first on the face and neck, but afterwards over the whole body, an eruption of raised, red spots, which coalesce, and form slightly elevated blotches of a crescentic shape; the tongue is coated, the fever high. The eruption was preceded and is accompanied by discharge from the nose, redness and swelling of the eyes, cough, and quickness of breathing.

The disease is *measles.*

531. Convulsions sometimes precede the eruption, and occasionally bleeding at the nose is observed. The cough and other chest symptoms are not generally relieved on the appearance of the rash. The highest temperature in ordinary cases is 103°; if it rises above this the case will be probably severe; if much below it will be a mild attack; the maximum of temperature is generally on the fifth day, after which it rapidly falls; the rash disappears on the fifth or sixth day after its coming out.

532. Measles may exist without catarrhal symptoms. Bronchitis, pneumonia, and diphtheritic inflammation of the larynx are the chief causes of danger during the attack; but phthisis, diphtheria, diseases of the bones and glands, and chronic ophthalmia, are sometimes induced by the complaint. There are two varieties of measles, the slight and severe; in the latter the eruption is of a dark purple colour, and there is great danger to the patient.

533. *b.* On the second day of the fever there has appeared on the face and neck a diffused scarlet rash, which extends over the whole body. The throat is inflamed, the tonsils enlarged, and often ulcerated; the pulse very rapid, the skin hot and dry, the tongue at first coated, with red tip and edges and red elevated papillæ, afterwards it is clean and raw-looking. The eruption is generally preceded in children by vomiting.

The disease is *scarlatina.*

534. Delirium and convulsions occasionally usher in the disease. The eruption usually declines on the fourth or fifth day, and is followed by peeling off of the skin, especially of that covering the hands and feet. The temperature rarely rises above 105°, but it may nearly reach that height on the first day of the eruption. The temperature is generally at its maximum on the third day of the fever, from the third to the ninth it ranges between 103·8° and 102·9°, and subsides between the tenth and twelfth day, unless the throat be severely affected. The pulse falls along with the temperature. The danger of the early period of scarlatina is generally in proportion to the severity of the throat affection; but life may be destroyed by "malignant scarlatina" at the very outset of the disease. After the cessation of the fever, and usually from the tenth to the twentieth day, the patient is liable to acute nephritis, indicated by bloody or albuminous urine and dropsy of the body and limbs (208); sometimes associated with convulsions or hydrothorax. In other cases scarlatina gives rise to rheumatism, dis-

charge from the ear and consequent deafness, or diphtheria. As soon as the rash has disappeared the urine should be tested daily for albumen.

535. Scarlatina may be confounded with roseola, measles, or small-pox. The eruption of roseola is mostly in irregular, rose-coloured blotches, confined to the chest, the throat is less affected, and the accompanying fever is slight. It is known from measles by the absence of the affection of the eyes, nose, and bronchial tubes, and by the different appearance of the rash. Small-pox is sometimes ushered in with an eruption like scarlatina; but the previous pain of the back and the subsequent papular form of eruption serve to distinguish it.

536. There are two varieties of the disease, "scarlatina mitior" and "scarlatina gravior." In the latter the tonsils are of a deep, almost livid colour, sloughing takes place, and the ulcerations are slow in healing; there is consequently greater danger to life.

537. There is an eruptive fever ("Rubeola" or "Rötheln") which seems to be a hybrid between measles and scarlatina. It is preceded by catarrh, the eruption appears on the third or fourth day as minute, red spots that form elevated, irregularly-shaped patches; it is sometimes followed by dropsy.

538. *c.* The patient is attacked with redness, heat, and swelling of some part of the body, often attended with the formation of vesicles; the inflammation commences at one part and gradually spreads. There is great pain and stiffness of the parts affected, and the neighbouring lymphatic glands are swollen. The accompanying fever is usually high.

The disease is *erysipelas.*

539. The most usual site for erysipelas, in medical practice, is the head and face. It is preceded by a certain amount of fever, and generally commences with a slight swelling over the bridge of the nose, or near one of the ears, from which it spreads until the whole face and scalp are affected. The temperature in the

axilla is high, but varies greatly in the course of the disorder. In many cases suppuration of the subcutaneous cellular tissue occurs, and abscesses form as the inflammation subsides. Occasionally the membranes of the brain are attacked, and the symptoms of meningitis present themselves.

540. *d.* On the third or fourth day of illness an eruption has appeared of a papular form; on the second or third day of the appearance of the spots they have become vesicular and afterwards pustular. The eruption is preceded by severe pain of the back, rigors, vomiting, headache, restlessness and fever.

The disease is *small-pox.*

541. The fever is usually relieved when the eruption comes out. The spots become pustular about the fifth or sixth day after their appearance; on the eighth day matter begins to ooze from their edges, and a decided increase of fever sets in ("secondary fever.") Scabs are formed and fall off on the fourteenth or fifteenth day, leaving deep pits in their place. The temperature falls when the spots appear, perhaps from 106° to 100°, but it augments again when the secondary fever sets in. Small-pox is termed "*discrete*" when the spots are separate; "*confluent*" when these run together. When the disease is "*modified*" by vaccination, although the primary fever may be very severe, the spots form scabs, and die away about the eighth day without any secondary fever. Small-pox may be complicated, especially during the secondary fever, with pneumonia or bronchitis; or it may be followed by abscesses in various parts of the body, ulceration of the cornea, or pyæmia.

542. Small-pox is chiefly distinguished from other eruptive fevers in the primary stage by the severe pain of the back and the vomiting that accompany it. In the early stage of the eruption the fact that the spots feel to the finger as if small shots were embedded in the skin, is very valuable in distinguishing this complaint from measles and scarlatina. In the worst forms of variola the eruption is sometimes preceded by a livid

redness, more or less diffused, of the skin; delirium and typhoid symptoms, or hæmorrhage from the mucous membranes, may speedily follow.

543. *e.* On the second day of a mild fever there has appeared an eruption, which is at first papular, but in a few hours becomes vesicular. The spots have no inflammatory ring around them in the first stage.

The disease is *chicken-pox*.

544. This disease is peculiar to childhood and early adult age. The eruption consists of a series of crops that succeed each other for four or six days, at intervals of twenty-four hours. Each spot forms a scab, which falls off, and seldom leaves any pit. It is distinguished from small-pox by the mildness of the premonitory symptoms, the distinctly vesicular character of the spots, the absence of hardness to the finger, and by the shorter course of the complaint.

SECTION II.

NO ERUPTION HAS APPEARED IN THE EARLY STAGE OF THE FEVER, AND IF PRESENT IT IS USUALLY SMALL IN AMOUNT; THE FEBRILE SYMPTOMS HAVE BEEN CONTINUOUS FROM THEIR COMMENCEMENT.

545. Under this head you may have,—typhus, typhoid, relapsing fever, influenza, febricula, and rheumatic fever (562).

546. *a.* The patient lies on his back in a state of half-consciousness, or low muttering delirium; the eye is injected, and the cheeks are uniformly flushed and of a dusky colour. The lips are covered with sordes, the tongue dry and brown. There is thirst and absence of appetite, but the bowels are not usually purged. The pulse is rapid and feeble, skin hot, respiration increased in frequency. An eruption generally appears from the fifth to the seventh day, the spots of which are dark-coloured and persistent; they are at first slightly elevated, but after the first few days of

their appearance become flat, and do not disappear, although they are made paler by pressure.

The disease is *typhus*.

547. The attack of typhus is generally sudden, and begins with chilliness, lassitude, pain of the head, quick pulse, and hot skin. The loss of muscular power is early and marked. The tongue is at first large and pale, afterwards covered with a yellow brown fur. As the disease advances the stupor increases; the pupils are contracted, the muscles twitch, the hands tremble or catch at the bedclothes. The pulse is so rapid and feeble as scarcely to be felt. In severe cases the impulse and the first sound of the heart are very feeble, or may be undistinguishable; the second sound being clear and distinct. The temperature is usually highest in the evening. If before the fourth day it does not exceed 103·5°, the case will be probably a mild one; the maximum of temperature is commonly attained before the ninth day. There is usually "defervescence" between the thirteenth and seventeenth day, and the decline of the fever is often very sudden, indicating a decided "crisis." The turning point of the fever is most generally the fourteenth day. Typhus is not unfrequently complicated with pneumonia, sometimes with convulsions. The rash is often absent in children and in young persons.

548. You may confound typhus with typhoid fever, pneumonia (90), and meningitis (474). You can only distinguish typhus when complicated by pneumonia from pneumonia attended with typhoid symptoms, by ascertaining which disease was first developed, and whether or not the characteristic eruption is present. In many cases delirium is a prominent symptom: it seldom sets in until the end of the first week; it is low and muttering, and accompanied by great restlessness. This symptom is apt to make the diagnosis between typhus and meningitis difficult, but the former differs from the latter in the appearance of the tongue, the presence of an eruption, and the feebleness of the

pulse. Meningitis is accompanied by vomiting, and the headache is more severe and constant than in typhus. It must be remembered that meningitis may occur occasionally as a complication of typhus.

549. *b.* The patient suffers from weakness; his mind is dull or wandering; the cheeks have a bright circumscribed flush; the tongue is coated, red, fissured, or dry. There is headache, thirst, loss of appetite, and purging of the bowels, the stools being of a yellow colour. The pulse is quick, the skin hot, and there is swelling of the abdomen, with tenderness and gurgling on pressure over the right iliac region. An eruption appears, about or after the seventh day, of a few rose-coloured, lenticular spots, which disappear for a moment on pressure. The eruption is chiefly confined to the chest and abdomen, and each spot disappears in a few days, to be succeeded by others near it.

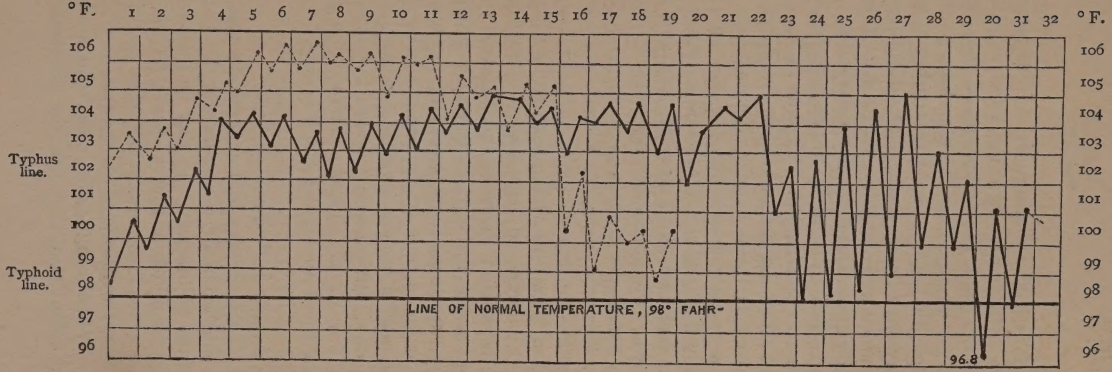
The disease is *enteric* or *typhoid fever*.

550. This disease is usually confined to persons below forty-five years of age, whilst typhus attacks individuals at any period of life. The approach of typhoid fever is usually insidious, and the first symptoms are those of dyspepsia, sleeplessness, languor, dull pain of the head, often succeeded by slight delirium at nights, loss of appetite, and diarrhœa. The fever generally terminates in twenty-one days, either by convalescence or death; but a fatal issue may occur, whilst the patient seems to be recovering, from perforation of the intestine or hæmorrhage from the bowels. Recovery is generally slow, and the mind often remains feeble for some weeks. Typhoid fever is often complicated with pneumonia, or it may be followed by phthisis. The temperature usually rises to its height about the evening of the third or fourth day—perhaps 104°. A *permanent* temperature of 104°, or an elevation of the morning over the evening temperature, is an unfavourable sign.

551. You will most easily confound enteric fever with meningitis, tubercular peritonitis, acute phthisis,

Fig. 41.

Typical ranges of temperature in cases of typhus and typhoid fever. The dotted line indicates the typhus range; the continuous dark line that of typhoid; the two dots under each day indicate the morning and evening temperatures. (Wunderlich and Traube.)



(*From* Aitken's *Practice of Medicine.*)

and typhus. You distinguish it from meningitis by the absence or less urgency of the vomiting, the less severe pain of the head, the feebleness of the pulse, the dryness of the tongue, and the diarrhœa present in fever. Although, in both typhoid and tubercular peritonitis, you may have hectic flush, pinched features, and pain of the abdomen and diarrhœa, yet in peritonitis the tongue is usually clean, and there is no eruption. Acute tuberculosis is distinguished by a careful examination of the chest and expectoration. Typhus differs from typhoid fever in attacking persons above forty-five years of age. The attack is more sudden, the duration shorter, delirium or stupor appears sooner, the face is dusky and generally flushed, the bowels are usually constipated, and the rash is darker, more general, and not, after the first day or two, obliterated by pressure, nor does it appear in successive crops.

552. Typhoid fever in children is often described as "infantile remittent fever."

553. *c.* The patient has been suddenly attacked with rigors, headache, and pain of the back or limbs, the tongue is white; there is thirst, often vomiting, and confined bowels; the pulse is very rapid, the skin hot and dry, with occasional sweatings; there is no eruption, but jaundice is often present. The symptoms disappear after a violent sweating from the fifth to the eighth day, but reappear as at first about the fourteenth day of the illness. The relapse usually ceases in from three to eight days, but may be succeeded by others.

The disease is "*relapsing fever*."

554. This disease seldom appears except as an epidemic, and is chiefly seen amongst the poor and ill-fed part of the population. It may be impossible to diagnose it from other fevers previous to the "crisis." Convalescence is generally very slow, and it is apt to be complicated with severe ophthalmic or rheumatic affections. When jaundice is present the stools are of their natural colour, and may even be abnormally dark.

555. Besides the above forms of fever you meet with what is termed "simple continued fever." In this there is headache, a frequent, full pulse, white and coated tongue, thirst, loss of appetite, hot, dry skin, and pains of the back and limbs, but it is unaccompanied by any eruption or profuse sweatings. Before determining a case to be one of simple continued fever, be careful to examine the condition of every important organ, lest the fever be the result of some hidden inflammation.

556. *d.* The patient is suddenly attacked with great prostration of strength and aching of the limbs, along with intense headache, discharge from the eyes and nose, sneezing, sore throat, dyspnœa, cough, and expectoration.

The disease is *influenza.*

557. Often severe frontal pain is first complained of. The catarrhal symptoms are at their height on the second or third day, and decline about the fifth to the seventh day. Cough and expectoration often remain for some time after the fever. Influenza is sometimes complicated with capillary bronchitis or pneumonia; it generally prevails as an epidemic. Fatal cases are chiefly confined to young or aged persons, or to those already affected with some serious disease of the heart or lungs. The average duration of the disease is from three to five days in mild cases, and from seven to ten in those more severely affected.

SECTION III.

The Patient is subject to Periodical Attacks of Fever.

558. Under this head you only meet with ague in this country.

559. *a.* The patient is periodically attacked with rigors attended with quick pulse, uneasiness, oppression, or sense of fatigue; this is succeeded, after a period

varying from half-an-hour to two hours, by great heat of skin, restlessness, thirst, rapid full pulse, and scanty secretion of urine; afterwards a profuse perspiration breaks out with relief of all the symptoms.

The disease is *ague.*

560. The mean duration of the first stage is from three to eight hours. Ague occurs under different forms. If the attack occurs daily it is termed *quotidian;* if every forty-eight hours *tertian;* if in seventy-two hours *quartan.* It is called *double tertian* when the patient is attacked daily, but the attacks of alternate days alone correspond in severity and time. Ague is sometimes complicated with enlargement of the liver and spleen. The rise in temperature is found to precede or commence with the cold stage; when the sweating has fairly set in the heat begins rapidly to fall.

CHAPTER XII.

RHEUMATISM AND GOUT.

561. These diseases are characterized by inflammation affecting the muscular, fibrous, or serous structures of the body; the inflammation seldom goes on to suppuration, and is apt frequently to change its seat. They may give rise to affections of many, if not of all the internal organs. They may attack the patient suddenly and be attended with considerable pain, or their course may be slow and lingering.

562. In Acute Rheumatism (Rheumatic Fever) the joints are swollen, hot, red, painful, and excessively tender. The larger articulations are chiefly affected, and different joints are either attacked together, or in succession, so that the patient lies in a helpless condition. The skin is covered with a profuse, acid perspiration, the urine is scanty and high coloured, the bowels confined, the pulse quick and bounding; there is constant thirst, and the tongue is white. In a large proportion of the cases pericarditis or endocarditis takes place; more rarely the patient is attacked with pleurisy, or pneumonia. The affection of the joints is generally preceded for twenty-four or forty-eight hours by chilliness, languor, heat of skin, and other symptoms of fever. In some cases the heart is affected at this period.

563. Subacute Rheumatism.—The pain and swelling of the joints are less, the fever is not so intense, and the liability to affections of the heart is not so great as in the acute form. A variety of it is often met with in persons suffering from gonorrhœa, and is termed *gonorrhœal rheumatism.*

564. Chronic Rheumatism may remain as the result of rheumatic fever, or it may attack those who have been previously healthy. There is no fever, but the parts affected are painful and tender, and the suffering is increased by motion. When it occurs in the joints adhesions are apt to take place, so that the motions of the limb become restrained.

565. Rheumatism is often named according to the structure principally affected. Thus lumbago, or rheumatism of the muscles of the loins, is termed *muscular rheumatism;* when the periosteum is inflamed, it is termed *periosteal rheumatism.* In the diagnosis of local rheumatism you must first exclude all other causes likely to produce the pain of which the patient complains; for instance, pain of the loins may arise from a disease of the spine or kidneys, from aneurism of the aorta, affections of the testes in the male, or of the uterus or ovaries in the female. If, then, you meet with a case of long-standing pain in this region, you should first ascertain that none of the above complaints are present before determining that rheumatism is the cause of the suffering.

566. Gout chiefly attacks the smaller joints, and may present itself as an acute or chronic affection. In the acute form the fever is less, but the pain is as severe as in rheumatism. Usually only one or two articulations are affected at a time, and the inflammation is succeeded by œdema, and desquamation of the skin takes place. Gout chiefly attacks persons of middle age, and the great toe is ordinarily first affected. "Chalk stones" are often formed near the joints. Dr. Garrod has proposed the following method of ascertaining the presence in the blood of gouty patients of uric acid, which is believed to be the cause of this complaint:—

567. "Take from one to two fluid drachms of the serum of the blood, and put it into a flattened glass dish or capsule; those I prefer are about three inches in diameter, and one-third of an inch in depth, which can

be readily procured at any glasshouse; to this add ordinary strong acetic acid in the proportion of six minims to each fluid drachm of serum, which usually causes the evolution of a few bubbles of gas. When the fluids are well mixed introduce a very fine thread, consisting of from one to three ultimate fibres about an inch in length, from a piece of unwashed huckaback, or other linen fabric, which should be depressed by means of a small rod, as a probe or point of a pencil; the glass should then be put aside in a moderately warm place until the serum is quite set, and almost dry; the mantel-piece in a room of the ordinary temperature, or a bookcase, answers very well, the time varying from twenty-four to forty-eight hours, depending on the warmth and dryness of the atmosphere. Should uric acid be present in the serum above a certain small amount, it will crystallize, and, during its crystallization, will be attracted to the thread, and assume forms not unlike that presented by sugar-candy on a string. To observe this, the glass containing the dried serum should be placed under a linear magnifying power of about fifty or sixty, procured with an inch object-glass and low eye-piece, or a single lens of one-sixth of an inch focus, answers perfectly."

568. Rheumatic Gout (Gouty Arthritis) is a slow, lingering, painful disease, that affects both the larger and smaller articulations. It first causes effusion into the joint, but afterwards the cartilages are diseased, and the limbs are often useless and distorted. It chiefly attacks persons of delicate constitution, and is most common amongst females at the commencement and termination of menstruation.

APPENDIX.

THE following table will be found useful in giving the student a clear idea of the seat of the lesions of the brain and spinal cord in cases of paralysis.

Tabular View of the seat of Lesion in Paralysis due to Injuries or Diseases of the Brain and Spinal Cord (chiefly from Dr. Brown-Séquard).

Symptoms.	Seat of Lesion.
Paralysis of the facial nerve (portio-dura) without deafness or anæsthesia (Bell's paralysis).	The nerve-trunk usually outside the cranium.
Partial anæsthesia (part of 5th nerve) and *partial* paralyses of other cranial nerves, as loss of smell, &c., and some forms of strabismus (squint), and ptosis (dropt eyelid).	Ditto.
Complete paralysis of any cranial nerve, particularly the whole 5th, 7th, or 8th pairs.	Almost always central; generally on the *same* side of the brain (probably *all* the cranial nerves decussate, as most certainly some do).
Right arm and leg paralysed, and *right* half of face partially so (mouth *drawn* to opposite side). *Left* hemiplegia *vice versâ*.	*Left* optic thalamus, corpus striatum, or cerebral lobe of *left* side, or *left* half of pons Varolii, *above* decussation of facial nerves.

Symptoms.	Seat of Lesion.
Right arm and *leg* paralysed, but *left* side of *face*.	*Left* half of pons Varolii, below decussation of facial.
Right arm and leg paralysed, but *both* sides of *face*.	*Left* side of pons Varolii at the *level* of decussation of facial nerves.
Right arm and leg powerless, and their *sensibility* and *heat* diminished. Temperature and sensibility of left arm and leg, &c., *increased*.	Medulla oblongata or pons Varolii on *left* side, *above* decussation of anterior pyramids.
Loss of *motion*, with *hyperæsthesia* and increased heat of right arm and leg, &c.; anæsthesia and loss of temperature in left arm, leg, &c.	Lesion in left side of medulla oblongata at *level* of decussation of anterior pyramids.
Right arm and leg paralysed (as to motion), more sensitive and hotter, but *left* arm and leg cooler, and less sensitive, or quite anæsthetic.	Injury to right half of spinal cord; above brachial plexus; below decussation of anterior pyramids.
Both legs paralysed, as to both motion and sensation. Paralysis of the sphincters of the bladder and rectum.	Both halves of spinal cord, *below* the brachial plexus.

INDEX.

Abscess of brain, 132
,, of liver, diagnosis of, 87
Ague, diagnosis of, 163
Albumen in urine, 66
Angina pectoris, symptoms of, 19
Aorta, aneurism of, 20, 129
,, dilatation of, 21
Aphonia, 62
Apoplexy, 136
,, of lungs, morbid appearances in, 27
Ascites, diagnosis of, 122
Arthritis, gouty, 167
Asthma, diagnosis of, 50

Bilious attack, diagnosis of, 103
Blood in urine, 69, 74
Brain, abscess of, morbid appearances in, 132
,, cancer of, 133
,, congestion of, 132
,, diseases of, 131
,, hæmorrhage into, morbid anatomy, 133; diagnosis of, 136
,, hypertrophy of, 150
,, softening of, morbid anatomy, 132; diagnosis of, 143
,, tubercle of, morbid anatomy, 133; diagnosis of, 138, 142
Bronchi, dilated, diagnosis of, 48, 49
Bronchitis, acute, morbid anatomy, 26; diagnosis of, 41
,, chronic, morbid anatomy, 26; diagnosis of, 48
Bronchophony, 31, 36

Calculus in kidney, 75
,, in ureter, 74, 115
Cancer of brain, 133
,, of kidney, morbid anatomy, 65; diagnosis of, 75
,, of liver, morbid anatomy, 84; diagnosis of, 92
,, of lung, 29, 40, 47
,, of stomach, morbid anatomy, 98; diagnosis of, 106, 125
Case-taking, rules for, 4
Casts of stomach tubes, 102
,, of tubes of kidney, 67
Catalepsy, diagnosis of, 138
Chicken-pox, diagnosis of, 158
Cholera, Asiatic, diagnosis of, 117
Chorea, diagnosis of, 149
Cirrhosis, morbid anatomy, 83, diagnosis of, 93
Cæcum, diseases of, 111, 119
Colic, diagnosis of, 115
Constipation, 120
Crepitations, 32
Croup, morbid anatomy, 55; diagnosis of, 60
,, false, 61
Cystine in urine, 80

Delirium tremens, diagnosis of, 142
Diabetes, 76
Diarrhœa, 118
Dilatation of heart, morbid anatomy, 8; diagnosis of, 15.
,, of kidney, morbid anatomy, 65, diagnosis of, 73
,, of stomach, morbid anatomy, 98; diagnosis of, 107
Diphtheria, morbid anatomy, 55; diagnosis of, 57
Dysentery, morbid anatomy, 111; diagnosis of, 116
Dyspepsia, diagnosis of, 104

Emphysema of lungs, morbid anatomy, 26; diagnosis of, 49
Encephalitis, morbid anatomy, 132; diagnosis of, 142
Endocarditis, morbid anatomy, 8; diagnosis of, 13
Enteric fever, diagnosis of, 160
Enteritis, morbid anatomy, 110; diagnosis of, 114

Epilepsy, diagnosis of, 139
Erysipelas, 156

Fatty degeneration of heart, morbid anatomy, 8; diagnosis of, 19
,, ,, of kidney, morbid anatomy, 64; diagnosis of, 71
,, ,, of liver, morbid anatomy, 84; diagnosis of, 90
,, ,, of stomach, 97
Fever, rheumatic, 165
Fevers, 152

Gall-ducts, morbid anatomy of, 84
Gall-stones, composition of, 85; diagnosis of, 88, 115
Gastritis, subacute, morbid anatomy, 96; diagnosis of, 104
,, chronic, morbid anatomy, 96; diagnosis of, 105
Gout, 166

Hæmaturia, intermittent, 76
Hæmorrhage of brain, morbid anatomy, 133; diagnosis of, 136, 145
Headache, causes of, 151
Heart, diseases of, 7
,, dilatation of, 8, 15
,, fatty degeneration of, 8, 19
,, hypertrophy of, 7, 14
,, valvular diseases of, 15
Hemiplegia, diagnosis of, 144
Hepatitis, morbid anatomy, 82; diagnosis of, 87
Hooping-cough, 42
Hydatids of liver, 83, 91
Hydropericardium, morbid anatomy, 7; diagnosis, 12, 15
Hydrocephalus, morbid anatomy, 131; diagnosis of, 138, 150
Hydrocephaloid disease, 139
Hydrothorax, 25, 44
Hydrophobia, 149

Influenza, 163
Intestines, diseases of, 109
,, tubercular affections of, 112
Intestinal obstruction, 116
Intus-susception of intestine, morbid anatomy, 110; diagnosis of, 116

Jaundice, 88

Kidneys, amyloid degeneration of, 64, 71
,, calculus of, 74, 75
,, cancer of, 65, 75
,, congestion of, 63
,, dilatation of, 65, 73
,, diseases of, 63
,, fatty degeneration of, 64, 71
,, granular disease of, 65, 71
,, tubercular disease of, 65, 73

Laryngoscope, method of using, 58
Larynx, diseases of, 55
,, œdema of, 55; diagnosis of, 61
Liver, abscess of, 87
,, acute yellow atrophy of, morbid anatomy, 83; diagnosis of, 89
,, amyloid degeneration of, morbid anatomy, 84; diagnosis of, 91
,, cancer of, morbid anatomy of, 84; diagnosis of, 92
,, congestion of, morbid anatomy, 82; diagnosis of, 87, 92
,, fatty degeneration of, 84, 90
,, hydatids of, 83, 91
Locomotor ataxia, morbid anatomy, 133; diagnosis of, 146
Lungs, apoplexy of, 27
,, cancer of, 29, 40, 47
,, emphysema of, 26, 49
,, tubercular disease of, 28, 45
,, œdema of, 27, 38
Lung-tissues in expectoration, 51

Measles, diagnosis of, 154
Meningitis, morbid anatomy, 131; diagnosis of, 138, 141, 143, 159
,, spinal, 133
Mesenteric glands, enlargement of, 128
Myelitis, 133

Nephritis, acute tubular, morbid anatomy, 63; diagnosis of, 70, 155
,, chronic tubular, morbid anatomy, 64; diagnosis of, 71
,, intertubular, morbid anatomy, 65; diagnosis of, 71
,, suppurative, 63
Neuralgia of stomach, 105
,, of scalp, 151

Œdema of larynx, morbid anatomy, 55; diagnosis of, 61
Œsophagus, stricture of, 56, 58
Ophthalmoscope, method of using the, 134
Ovarian dropsy, 122
Oxalate of lime in urine, 79

Palpitation, nervous, 14
Palsy, wasting, morbid anatomy, 133; diagnosis of, 148
Paralysis agitans, 150
,, of the insane, 146
Paraplegia, 147
Pectoriloquy, 31, 36
Percussion of chest, 30
Pericarditis, morbid appearances, 7; diagnosis of, 12, 13
Peritonitis, morbid anatomy, 109; diagnosis of, 113, 118
Perityphlitis, 111
Phthisis, morbid anatomy, 28; diagnosis of, 42, 45, 162
Pleurisy, morbid anatomy, 25; diagnosis of, 39, 41, 44, 90
Pneumonia, morbid anatomy, 27; diagnosis of, 37, 159
Pneumothorax, morbid anatomy, 26; diagnosis of, 43
Pulmonary apoplexy, 27
Pulse, examination of, 10

us in urine, 68, 72
Pylorus, stricture of, 98, 107

Relapsing fever, 162
Respiration, puerile, 30; bronchial, 31, 36; cavernous, 31, 35
Retinitis, 137
Rheumatism, acute, 165; subacute, 165; chronic, 166
Rhonchi, 32

Sarcinæ in contents of stomach, 101
Scarlatina, 155
Small-pox, 157
Softening of brain, 132, 143, 145
Sphygmograph, method of using, 22
Spirometer, 50
Spleen, diseases of, 127, 128
Sputa, lung-tissues in, 51
Stomach, amyloid degeneration of, 97
,, cancer of, 106, 125
,, congestion of, 95
,, dilatation of, 98, 107
,, diseases of, 95
,, fatty degeneration of, 97
,, post-mortem solution of, 95
,, ulcers of, morbid anatomy, 96, diagnosis of, 106
Stricture of intestine, 111; of pylorus, 98, 107
Sugar in urine, 66, 76
Sunstroke, 138

Temperature, in pneumonia, 38; in phthisis, 46; in fevers, 152
Tetanus, 149
Thermometer, method of using, 152
Throat, diseases of, 55
Tonsillitis, morbid anatomy, 55; diagnosis of, 57
Torulæ in contents of stomach, 101
Tubercle, of brain, 133, 138, 141
,, of intestines, 111
,, of kidney, 65, 73

Tubercle of lungs, 28, 45
Tumours of abdomen, 121
Typhoid fever, 160
Typhus fever, 158
Typhlitis, 111

Urea, estimation of, 153
Ureter, calculus in, 74, 115
Uric acid in blood, 166
,, deposits of, in urine, 78
Urinary deposits, 77
Urine, blood in, 69, 74
,, examination of, 66
,, mucus in, 77
,, pus in, 68, 72
,, specific gravity of, 66
,, sugar in, 76
Ulcer of stomach, morbid anatomy, 96; diagnosis of, 106

Valves of heart, disease of, 15

THE END.

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